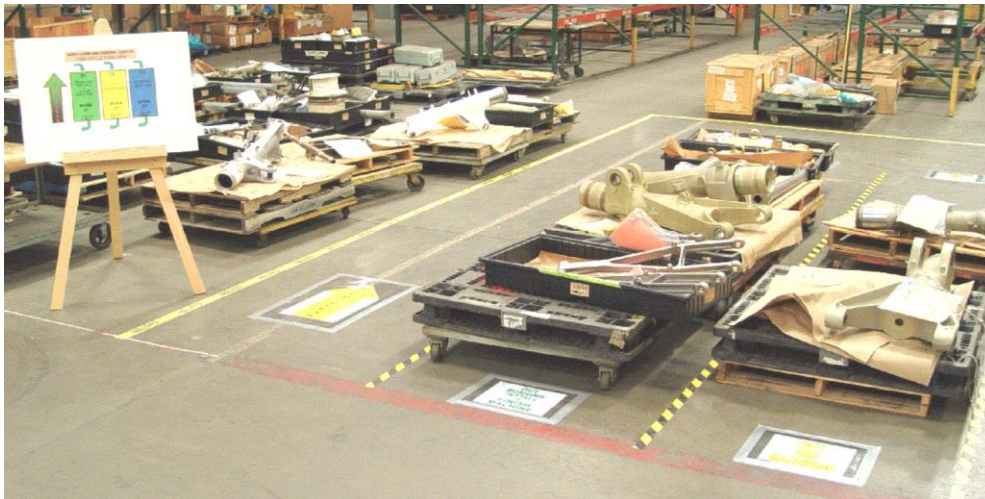
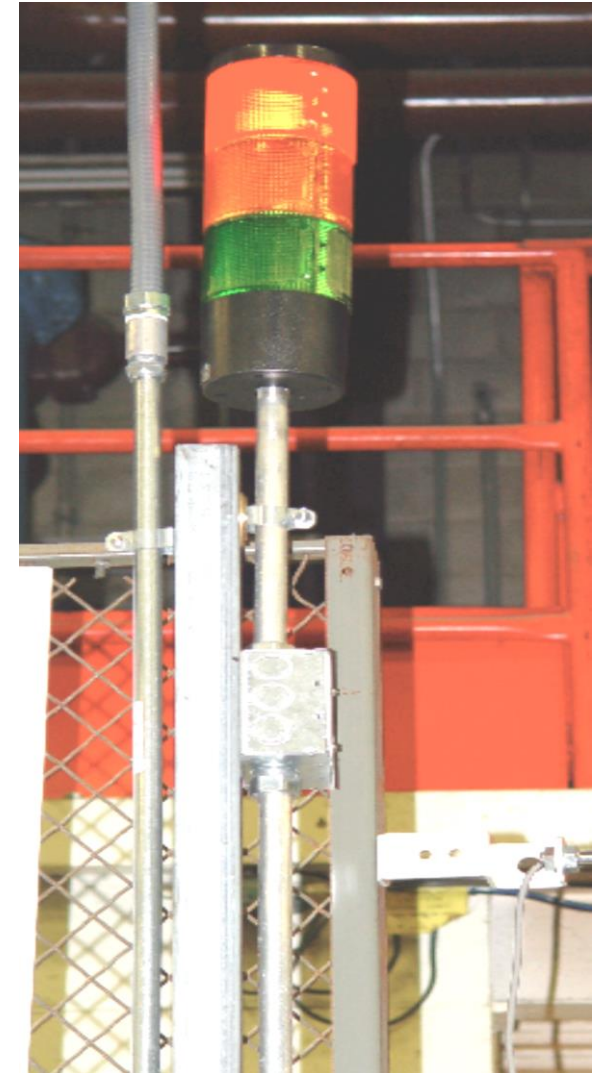
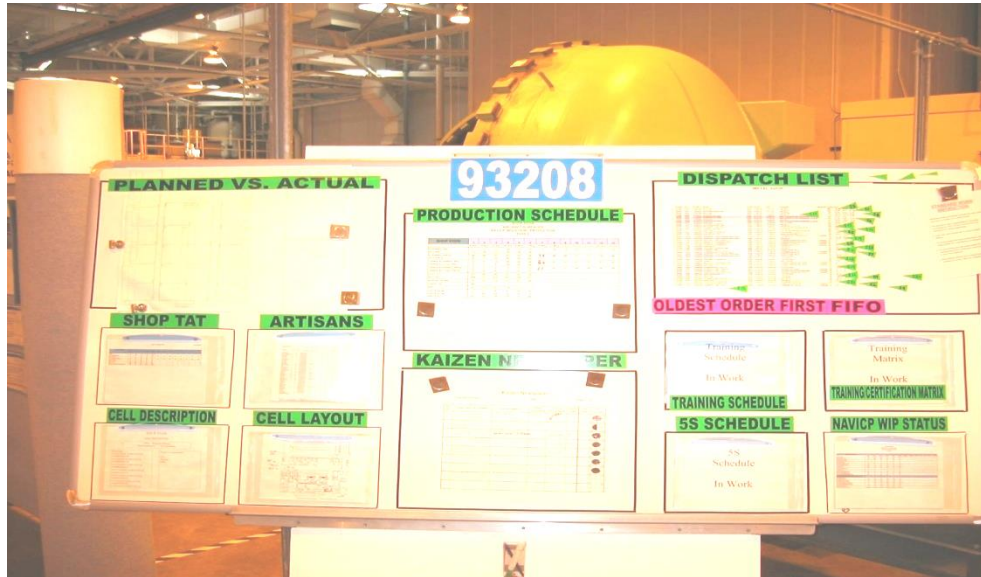
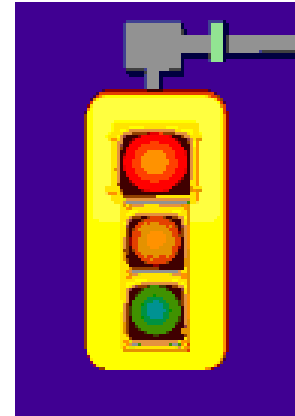


Visual Controls



What is a Visual Workplace?

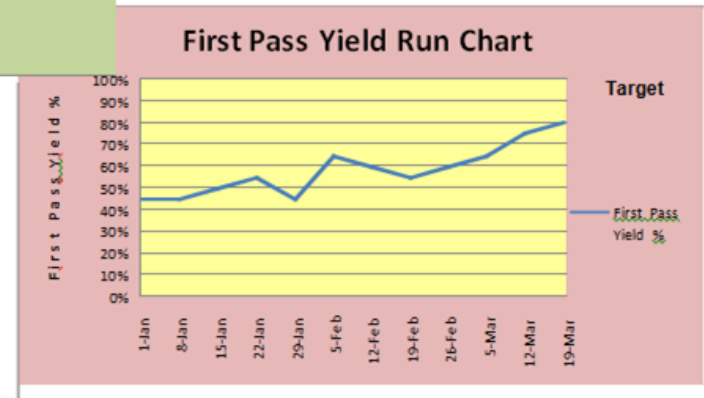
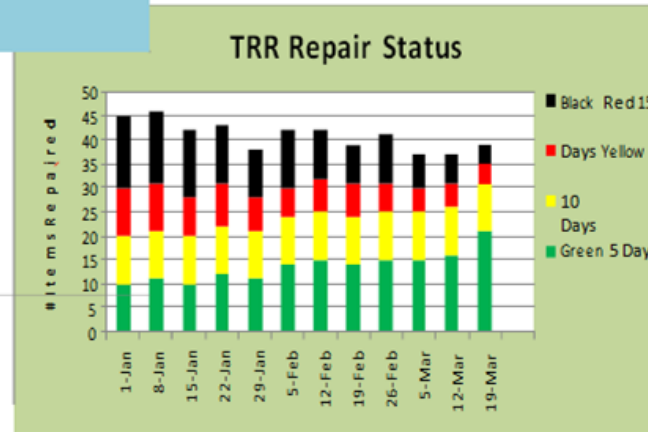
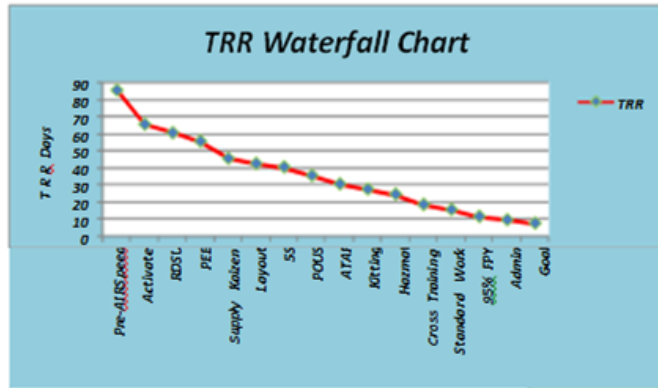
- When anyone can walk into a workplace and visually understand:
 - The current situation.
 - The work process.
 - Ahead, behind or on schedule.
 - When there is an abnormality.
- Use signals, lights, diagrams, charts and signs to:
 - Clearly **define** the **normal** condition or a **required action**.
 - **Expose** the **abnormal** undesired condition - **real time**.



Examples of Visual Controls

- Shadow boards for tools, supplies and safety equipment.
- Color coding such as Green / Yellow / Red.
- Lines on the floor to delineate storage areas, walk ways, work areas, etc.
- Marks to indicate correct machine settings.
- Andon lights.
- Standard work instructions, standard operating procedures (SOPs).
- Kanbans to control production.

Examples of Visual Controls – Management Reports



Visual Controls – Final Thoughts

- A signal that does not come on is meaningless.
 - Must come on to identify & expose waste or a required action.
- The number of times that a signal goes on is not important, but how long it takes for the signal to go off, is!

Standard Work

- To standardize a method is to choose out of the many methods the best one, and use it.
- Today's standardization, instead of being a barricade against improvement, is the necessary foundation on which tomorrow's improvement will be based.
- “If you think of ‘standardization’ as the best that you know today, but which is to be improved tomorrow, you get somewhere. But if you think of standards as confining, then progress stops.” *Henry Ford, 1926*
- Standard Work eliminates the possibility to do anything but follow established best practice.

Why Standard Work Is Important?

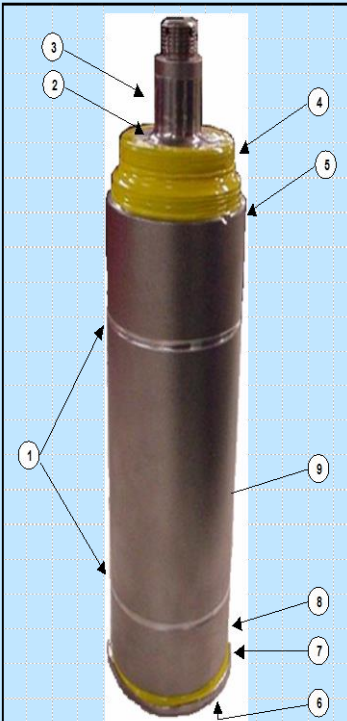
- Lowers Process Time.
 - Reduces variation - Work is performed the same way every time.
 - Decreases learning curve for rotating workforce.
 - More time is spent performing Value-Added activity.
 - Reduces time and cost across the Value Stream.
 - Supply knows what to Supply and when.
 - Tools, IMRL, paper work, and etc are also known.
 - Support organizations are more responsive.
- Critical in guaranteeing success every day.
- Increases quality and first-pass yield.
- Critical for effective Point of Use System (POUS) & 5S.








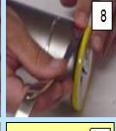
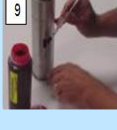

Standard Work Instructions

EXAMPLE:

Checklist, Masking for chrome plating

Standard Work Diagram	
Operation Name: Masking	Page: 1 of 2
Part Description: 89 Horizontal Pin	Prepared by: Doug Wickman
	Revision Date: 20-Oct-04



Detail Photos	
	
	
	
	
	

Material Required	
Seq	DESCRIPTION
1	Aluminum tape, 3/16"
2	Lead tape, 1"
3	Lead tape, 1"
4	Yellow tape, 1"
4	Lead tape, 1/2"
5	Lead tape, 1/2"
6	Aluminum tape, 3"
7	Yellow tape, 1/2"
8	Lead tape, 1/2"
9	Red lacquer, brush
10	Solvent, rag or papertowel

Standard Work Diagram	
Operation Name: Masking	Page: 2 of 2
Part Description: 89 Horizontal Pin	Prepared by: Doug Wickman
	Revision Date: 20-Oct-04

1 Cut strip of aluminum tape 3/16". Place in the two narrow grooves, rub well into place. Outer edges of the "groove" should be slightly visible.	8 Using 1/2" lead tape, apply to bottom edge of journal so it will overlap the yellow tape from step 7. Rub the lead tape into the groove. Trim off excess tape from journal.
2 Cut 5 pieces of 1" Lead tape. Cover the top area, overlapping at the "stub" and outside edges.	9 Paint keyway with red lacquer. Remove any excess paint from journal with reducer.
3 Cut a piece of 1" Lead tape. Wrap tape around the stub, overlapping the tape from step 2.	10 Check your work. Remove excess glue residue.
4 Wrap the threaded area with 1" yellow tape from the bottom corner of the threads to over the top edge, overlapping the lead tape from step 2. Secure the yellow tape by tying or overlapping with 1/2" lead tape.	11 End of task
5 Using 1/2" Lead Tape, cover around the edge of the journal so it will overlap the yellow tape from step 4. Rub into the corner and outer edge of journal. Trim excess lead tape from journal.	12
6 Apply 3" Aluminum tape to cover bottom of part. Trim off excess tape from journal.	13
7 Apply 1/2" yellow tape to the cover flange and overlap tape from step 6. Secure with 1/2" lead tape.	14

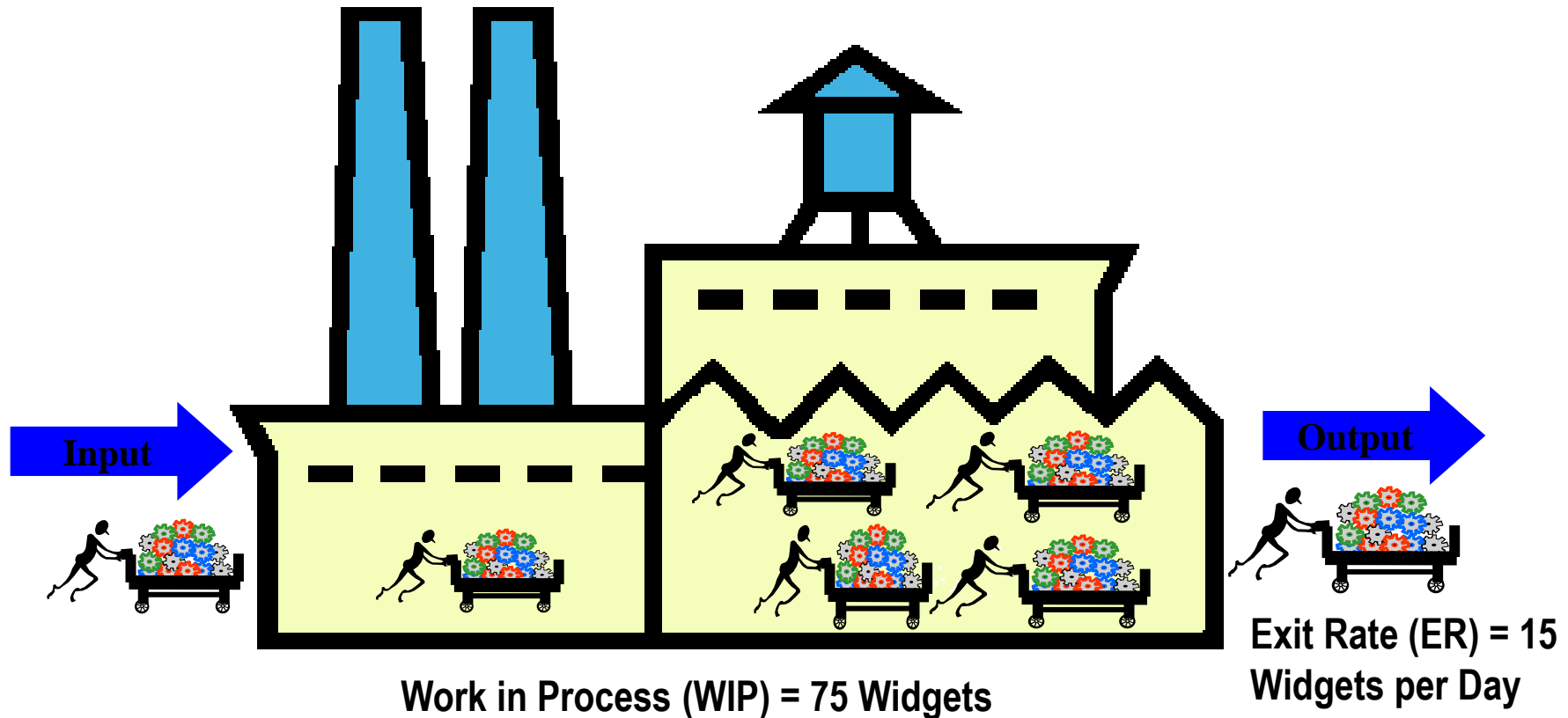
Time Components of Standard Work

- Process Lead Time
- Cycle Time
- Takt Time

Process Lead Time

- The time required to complete an entire process.
- Examples:
 - Time to produce an item.
 - Time to complete an approval process.
 - Time to complete a report.

Little's Law Example



$$\text{LeadTime} = \frac{\text{Work In Process (WIP)}}{\text{Exit Rate (ER)}} = \frac{75}{15} = 5 \text{ days}$$

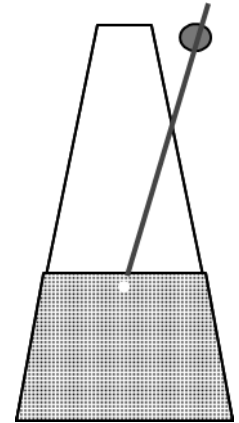
Cycle Time

- The average time it takes between the completion of two individual units of production.
- Example
 - The cycle time of leave requests approved at a rate of 10 per hour would be 6 minutes per request.

Takt Time

The rate at which a product or service needs to be provided to meet customer demand.

$$\text{Takt Time} = \frac{\text{Time Available}}{\text{Customer Demand}}$$



Takt Time

- 250 Available Workdays per Year.
 - (assuming 5-day work week)
- Customer requires 30 Units per Year.

$$\text{Takt Time} = \frac{(250 \text{ days})}{(30 \text{ Units})}$$

$$\text{Takt Time} = 8.3 \text{ days per Unit}$$

- With a Takt Time of 8.3 days, you must induct and sell a unit every 8.3 workdays in order to meet the Customers annual demands.

Load Leveling

- Load Leveling is balancing a process between several staff positions.
- Cycle Time must be less than or equal to Takt Time.



- Wait Time is commonly added to Standard Work to synchronize sub-jobs across staff positions.

Mistake Proofing

Remove before flight



“Anything that can go wrong, will go wrong!”
That is why we need mistake-proofing.

What is Mistake Proofing?

- The use of process or design features to prevent errors or negative impacts.
- Also known as Poka Yoke, Japanese term for “avoiding inadvertent errors” which was formalized by Shigeo Shingo.
- Less expensive than the cost of rework.
- Based on simplicity and ingenuity.
- Very effective.

Everyday Examples



Everyday Examples



Benefits of Lean

- Work Smarter **not Harder.**
- Reduces costs by:
 - Reducing delivery time, cycle time, set-up time.
 - Eliminating waste.
 - Seeking continuous improvement.
- Improves quality.
- Increases overall customer satisfaction.
- Improves employee morale and working environment.

Lean Thinking Exercise



Summary

- 8 Types of Wastes
- 5S + 1
- Takt Time

**Are there any comments or
questions?**



Yellow Belt

Lean Six Sigma

Lesson 3

Learning Objectives

- Transformation to Lean Six Sigma (LSS).
- Define-Measure-Analyze-Improve-Control.
- LSS in Kaizen / Rapid Improvement Events (RIE).

What is Six Sigma?

Tools and Methodology to:



Eliminate Defects

**WAR
ON
VARIATION!**



Reduce Variation

By using:

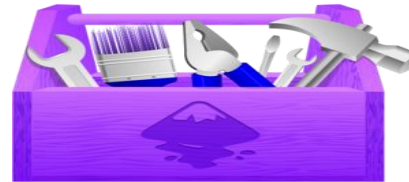
**Measurement Systems
Analysis**

Pareto Charts

DMAIC

**Statistical
Process Control**

**Value Stream
Mapping**



**Six Sigma
Toolbox**

**Analysis of
Variance**

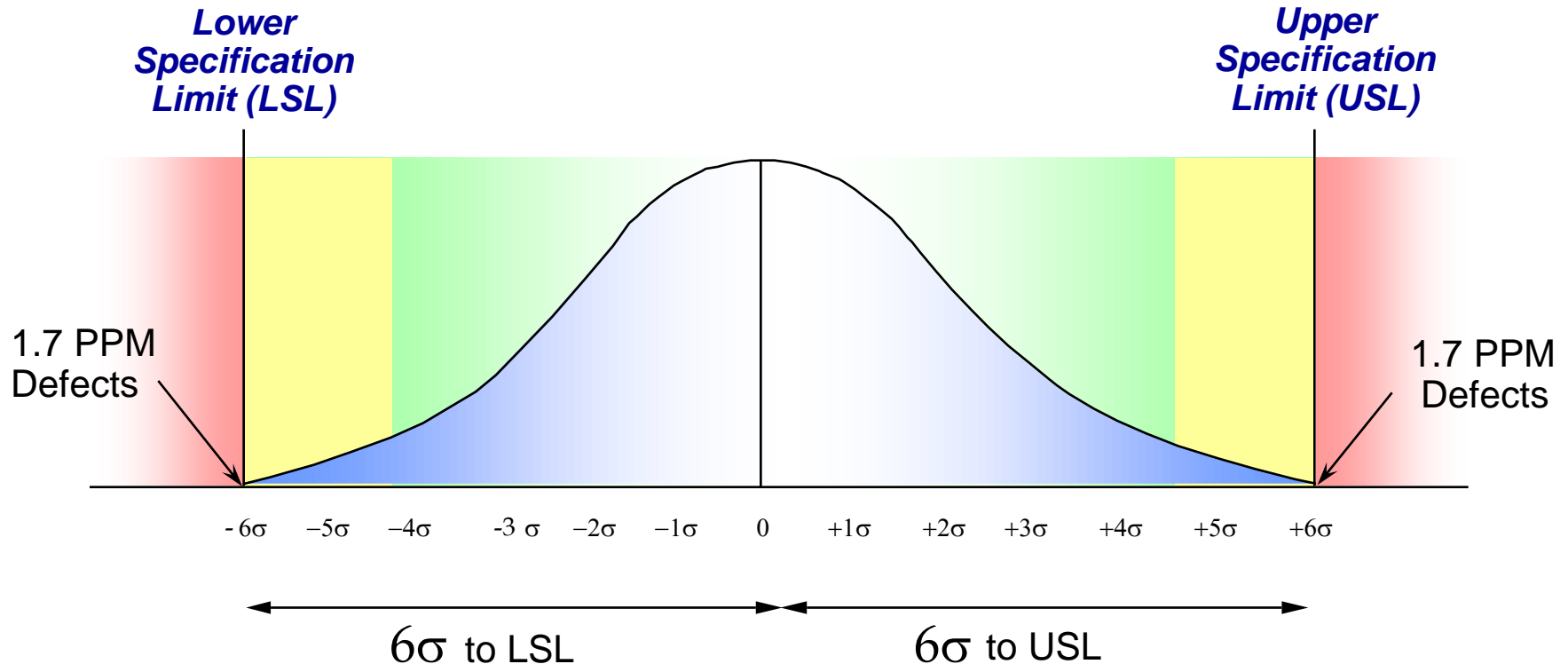
Histograms

Control Charts

**Voice of the
Customer**

**Cause and Effect
Diagrams**

Six Sigma



Six Sigma is a fact based, data driven philosophy of improvement that values defect prevention. It drives customer satisfaction and bottom-line results by reducing variation and waste, thereby promoting a competitive advantage.

The Certified Six Sigma Black Belt Handbook, ASQ 2005



Types of Variation

- **Common cause (inherent) variation** is always present in a process.
 - A process that exhibits only common cause variation is a stable process.
 - A stable process is predictable.
- **Special cause (assignable) variation** is some unusual, uncommon event.
 - A process that exhibits special cause variation is an unstable process.
 - An unstable process is unpredictable.

Difference Between 3 and 6 Sigma

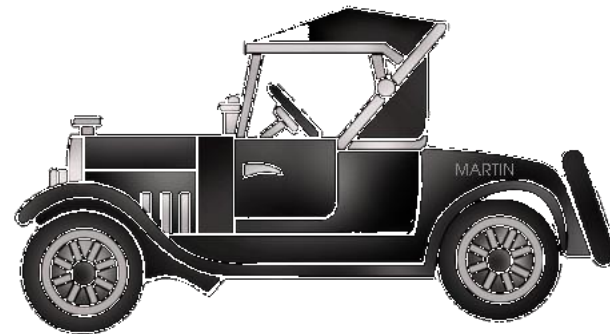
Most U.S. companies operate @ 3-4 Sigma
97.7% performance (or up to 25% total revenue in defects).

THREE SIGMA	SIX SIGMA
More than 40,500 newborn babies dropped in hospitals each year.	Three newborn babies dropped in hospitals in 100 years.
Unsafe drinking water about two hours each month.	Unsafe drinking water one second every six years.
Nearly 1,350 incorrect surgical operations per week.	One incorrect surgical operation in 20 years.
Five short or long landings at O'Hare each day.	One short or long landing in 10 years in all the airports in the United States.
<u>2.3</u> Defects per <u>hundred</u> opportunities.	<u>3.4</u> Defects per <u>million</u> opportunities.

Six Sigma Background

Six Sigma/Quality Roots:

- Henry Ford Model T- you can have your car any color you want as long as you want it in the color black.



Six Sigma Background (cont.)

Statistical Process Control



- *Walter Shewhart (shoe-heart) of Bell Labs at Western Electric.*
- *World War II Military Equipment and Logistics.*

Six Sigma Basics

- Manufacturing Quality in decline in U.S. Plants.
- Bill Smith, Quality Manager for Motorola helped revive their quality.
- 1991 the paradigm went to MAIC as pattern to solve manufacturing quality problems.

Six Sigma Basics

Six Sigma- Six Sigma Plus- LeanSigma



Benefits of Lean Six Sigma

- Improve customer relations by addressing process/product problems.
- Align processes to the customers needs.
- Improve Operations for Customers and Suppliers.
- Save Resources by Achieving Greater Efficiencies.

Lean Six Sigma Defined



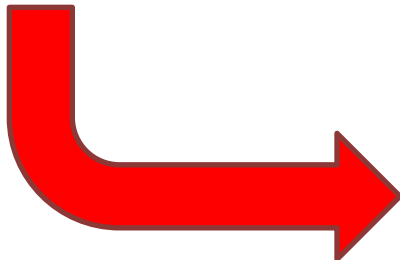
Lean

Eliminate Waste
Improve Flow

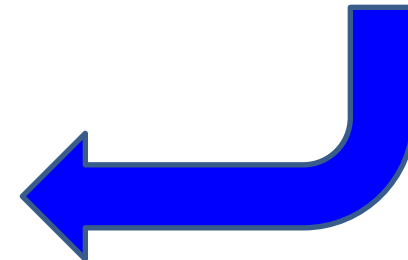


Six Sigma

Reduce Variation
Eliminate Defects



Lean Six Sigma



**Together providing the customer with the best possible
Value in Quality, Cost and Delivery**

Lean Six Sigma Guiding Principles

- **Results**

- Create value for customers.

- **Velocity**

- Produce only what is needed.
- Eliminate anything that stops the flow of creation.

- **Build in Quality**

- Never pass a defect onto the next process.
- Build quality in instead of inspecting it in.

- **Continuous Improvement**

- Relentless elimination of waste.
- Embrace scientific problem solving.
- Observe problems first hand.
- Make problems visible
- Develop people.
- Promote teamwork.
- Lead with humility.

Lean Problems - Plan Do Check Act (PDCA)

- **Plan**

- Describe the problem. Select the problem / process that will be addressed first (or next) and describe the improvement opportunity.
- Describe the current process surrounding the improvement opportunity.
- Identify root cause(s). Describe all the possible causes of the problem and agree on the root cause(s).
- Develop an effective and workable solution and action plan, including targets for improvement.

- **Do**

- Implement the solution or process change.

- **Check**

- Review and evaluate the result of the change.

- **Act**

- Reflect and act on learnings.



Six Sigma Problems - DMAIC

Define	Identify the problem
Measure	Metrics, Current State
Analyze	Determine Cause and Impact
Improve	Find Solutions, Lean, Optimization
Control	Maintain Improvements

Define Phase

Objectives:

- Identify what adds value to the process from both the business and customer perspective (VOB, VOC).
- Develop the business processes, define the critical customer requirements.

Activities:

- Team Charter.
- Identify Team members, validate and develop team charter, Identify stakeholders.
- Supplier-Input-Process-Output-Customer (SIPOC).
- Define project goals.
- Leadership approval (Review).

Define Phase Tools

- Tools

- Project Charter
- Supplier-Input-Process-Output-Customer (SIPOC)
- Voice of the Customer (VOC)
- Communication Plan
- Time lines and Milestones



PROJECT CHARTER	
Business Impact	<ul style="list-style-type: none">• Why should we do this? What is the benefit?• What is the quantified value of the project (\$\$\$)?• How does this project align with the business strategy?
Opportunity or Problem Statement	<ul style="list-style-type: none">• What "pain" are we or our customers experiencing?• What is wrong or not working?• Why do we think we can generate the value proposition described in the Business Case?
Goal Statement	<ul style="list-style-type: none">• Specifically, what are we going to do and deliver?• What are our improvement objectives and targets?• How will success be measured? What specific parameters will be measured? Define Y & X(s)
Project Scope	<ul style="list-style-type: none">• What are the boundaries of the initiative (start and end year of the process)?• What authority do we have?• What is not within scope?
Project Plan	<ul style="list-style-type: none">• When are we going to complete the work?• What are the major milestones?
Team Selection	<ul style="list-style-type: none">• Who are the team members?• What is their role?• How much of their time will be dedicated to the project?

Project Charter



- Using the DMAIC method.
 - Can you Define the problem?
 - Do you know where the problem is occurring?
 - What is the extent of the problem?
 - What is the impact?
 - What is important to the customer (VOC)?
- These questions form the basis of a project charter.



Project Charter

- Problem Statement
 - The time it takes to process passports is lengthy.
- Goal Statement
 - Improve the Passport Office operating efficiency by:
 - Reduce Process time to issue passports.
 - Improve capacity to process passports.
- In Scope
 - Processes within MCBQ Passport Office.
- Out of Scope
 - Processes outside of MCBQ Passport Office.

Opportunity or Problem Statements

- Example of a bad Opportunity or Problem statement.
- It takes too long to process a material order form and wrong parts are ordered.

- Example of a better Opportunity or problem statement.

- The material ordering process for navy base southwest takes in excess of 30 days. The problem has existed for the past year. 85% of the orders require rework due to wrong parts. This has resulted in the postponement of 60 projects in the last 6 months.

What

Where

When

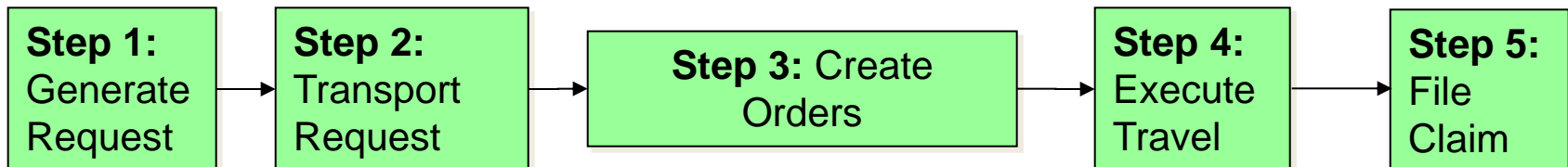
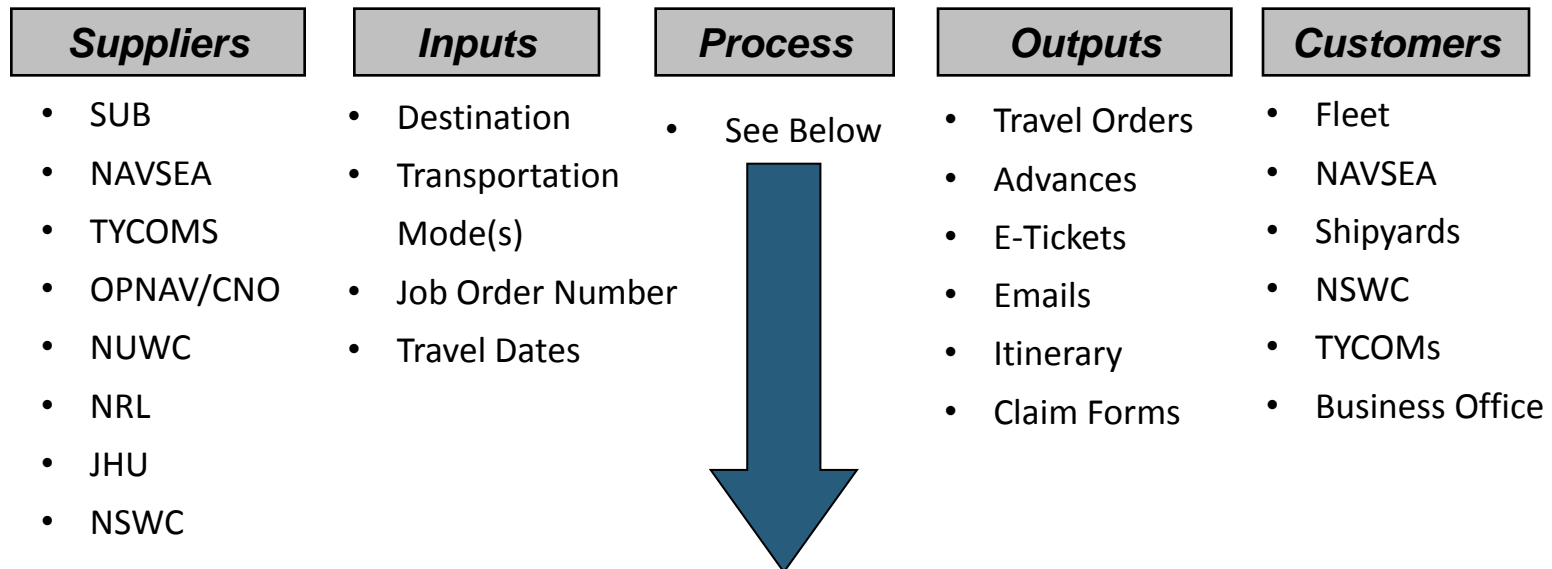
Extent

Impact



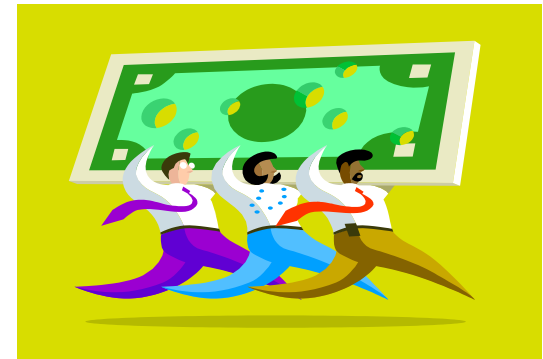
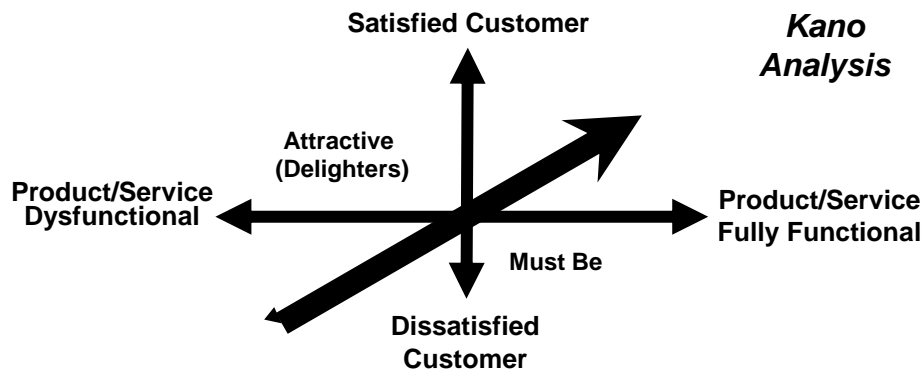
SIPOC

- SIPOC stands for Suppliers, Inputs, Process, Outputs and Customers.
- A process snapshot that captures information to a project.



Voice of the Customer (VOC)

- CPI projects obtain VOC as part of the Define and Measure phase.
- You must:
 - Identify all customers.
 - Prioritize customers.
 - Gather the Voice of the Customer.
 - Translate customer wants into critical customer requirements and prioritize them.



Translating VOC into Customer Requirements

Customer requirements must:

- Relate directly to the process of producing a service or product.
- Be measurable and specific.
- Cannot be vague and incomplete.
- Not be biased toward a particular solution or approach.

Example:

- Customer comment:
 - “We are unable to depend on delivery time when we need to get our parts”
- Customers Key Issue:
 - There is too much variation in delivery days, and the delivery must fit within a specific window of time.
- Customer requirement:
 - Delivery products no earlier than three days and no greater than five days from the date of the confirmed order.

Measure Phase

Objectives:

- Identify critical measurements.
- Understand the data calculations.

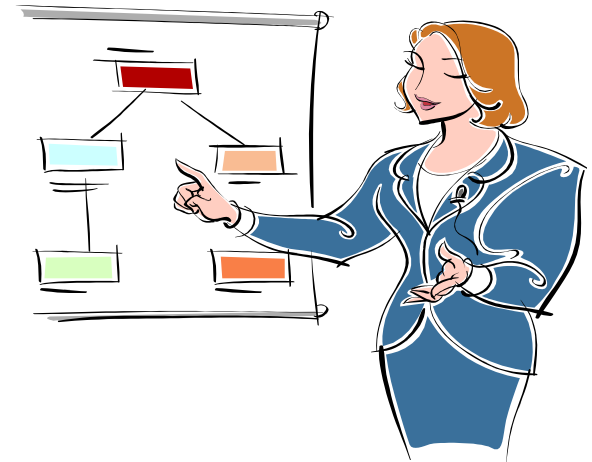
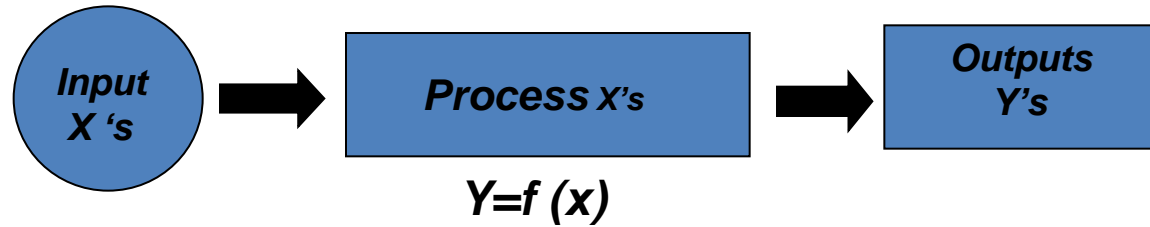
Activities:

- Map process and identify inputs and Outputs.
- Establish Measurement plan.
- Collect baseline performance data.
- Validate measurement system.
- Leadership approval (Review).

Measure Phase Tools

- Tools

- Data collection plan
- Walk the Gemba
- Process Maps
- Spaghetti Diagrams



Data Types

Da•ta (Da' tä, Dä'tä) *pl n. (singular or plural in number)* – Information, usually organized for analysis.

Variable Data

- Data that could be measured on an infinitely divisible scale or continuum. There are no gaps between possible values.
- Examples:
 - Tire pressure (lbs/sq.in.)
 - Cycle Time (minutes)
 - Speed (mph)
 - Length (inches)
 - Response time (milliseconds)



Attribute Data

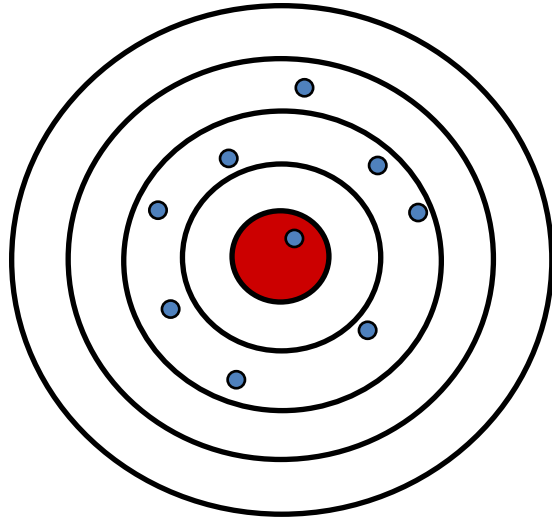
- Discrete data measures attributes, qualitative conditions, and counts. There are gaps between possible values.
- **Examples:**
 - # defects per unit
 - PO's placed per day
 - Number of calls on hold per hour
 - Shoe Size
 - Number of employees

Data Types Quiz

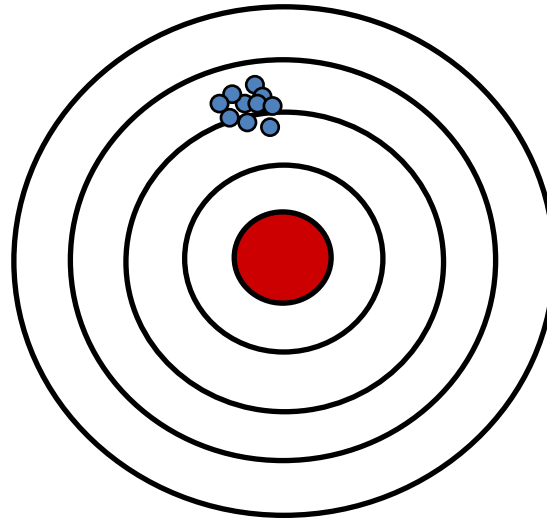
Beside the following examples, write either “Variable” (continuous) or “Attribute” (discrete).

- Average Labor Hours
- Data input accuracy
- Responsible organization
- Hole diameter using a “go/no-go” gage
- Hole diameter
- Order turnaround time
- Weight of refrigeration charge (grams)
- Cycle Time
- Certification Defects

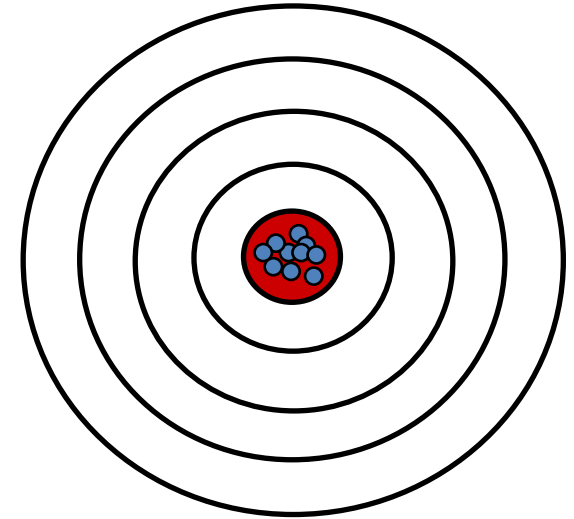
Measurement Properties



Accuracy
without
Precision



Precision
without
Accuracy



Accuracy
and
Precision

Data Collection Plan

- **Key questions to consider:**
 - *What are we measuring?*
 - *How will we gather the data?*
 - *Who will gather the data?*
 - *When / how often will the data be gathered?*
 - *Who needs to see the data?*
 - *What is the desired or required level of performance?*

Objective (Why)	Measures / Data (What)	Data Collection Method (How)	Data Sources (Where)	Timing (When)	Responsible Party (Who)

Walk The Gemba

- Gemba means “real place” or “go see.”
- The work place is where value is created.
- Management has a responsibility to “get the facts” from the work space.

The Five Actuals

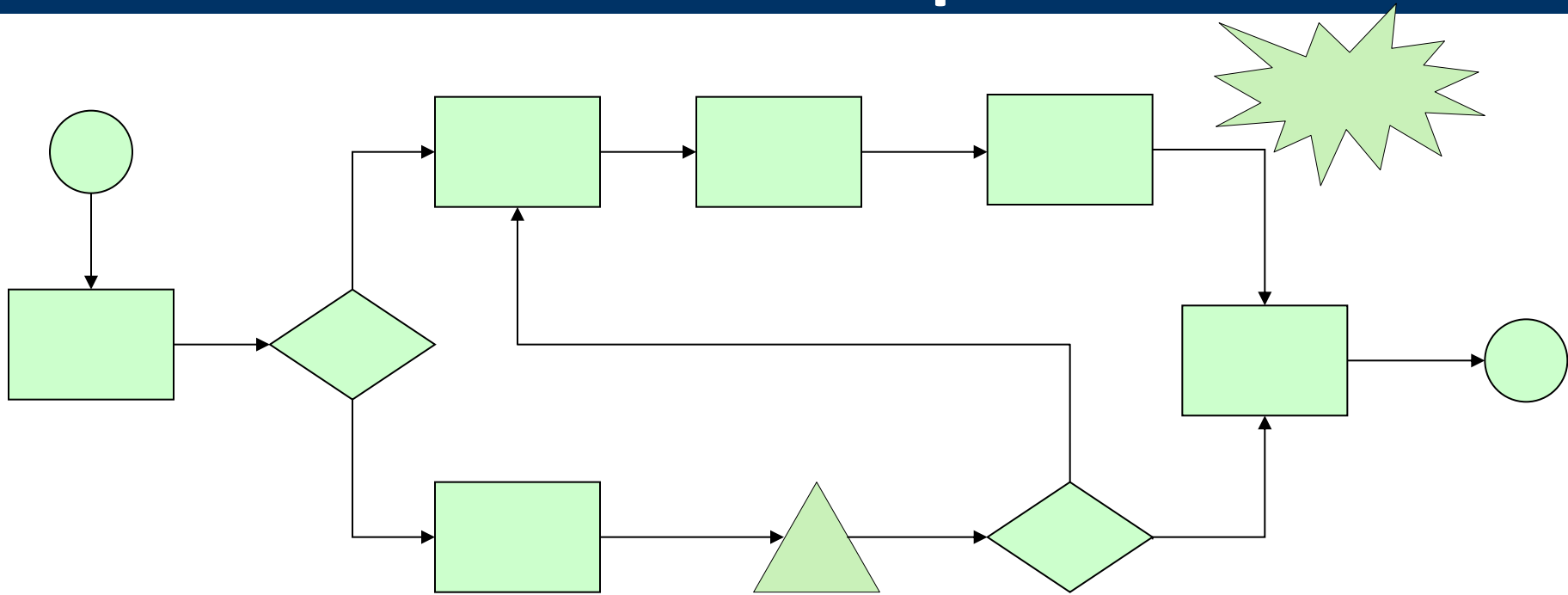
1. Go to the actual workplace.
2. Engage the people who do the actual work.
3. Observe the actual process.
4. Collect the actual data.
5. Understand the actual value stream.

Direct Observation Leads to Better Understanding.

Process Maps

- Used for visualizing a system or process (sequence of events, tasks, activities, steps).
 - Can be used to identify opportunities for improvement such as streamlining or combining operations.
- Drawn with standard symbols representing different types of activities or operations.
- Several Types: Linear, Top-Down, Swim Lane, Value Stream

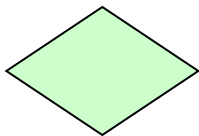
Process Maps



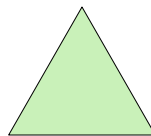
Standard Process Map Symbols:



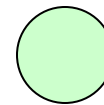
Process Step



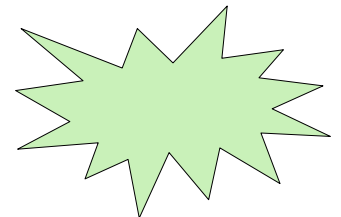
Decision Point



Wait (Inventory)

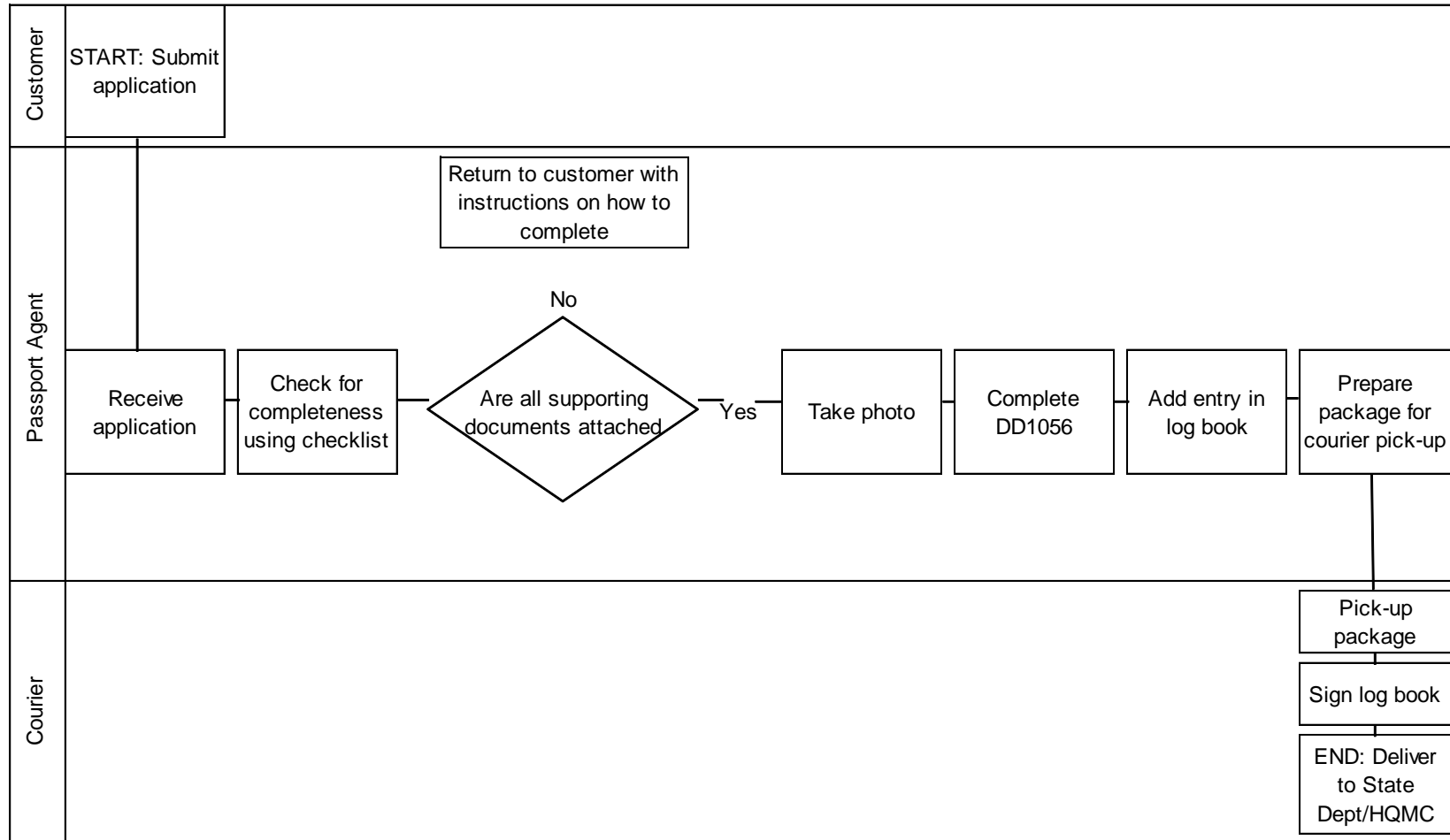


Start/Stop
Redirect



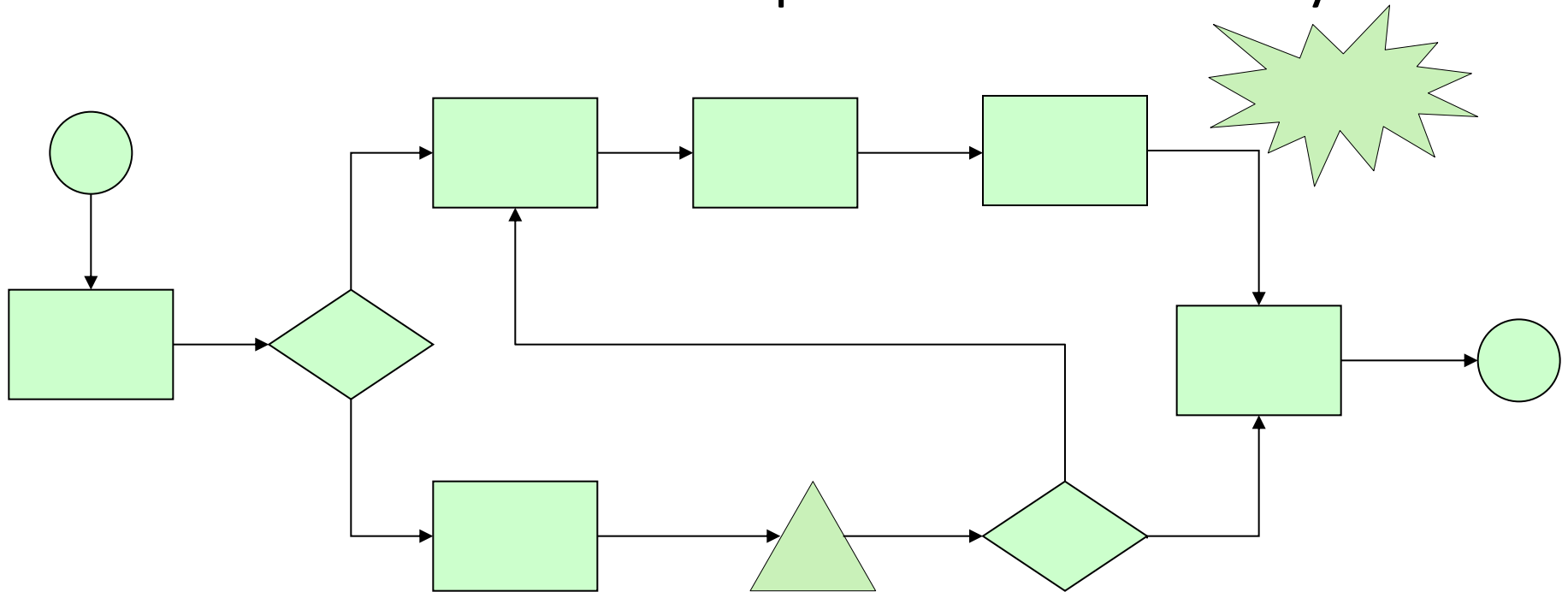
Project Burst

Process Map Example



How to Build a Process Map

- Walk the Gemba (workplace/process), noting process steps, decision points and inventory (wait points).
- Keep track of forms/documents used, and obvious improvement areas with project bursts.
- Use Post-it® to allow for steps to be moved easily.

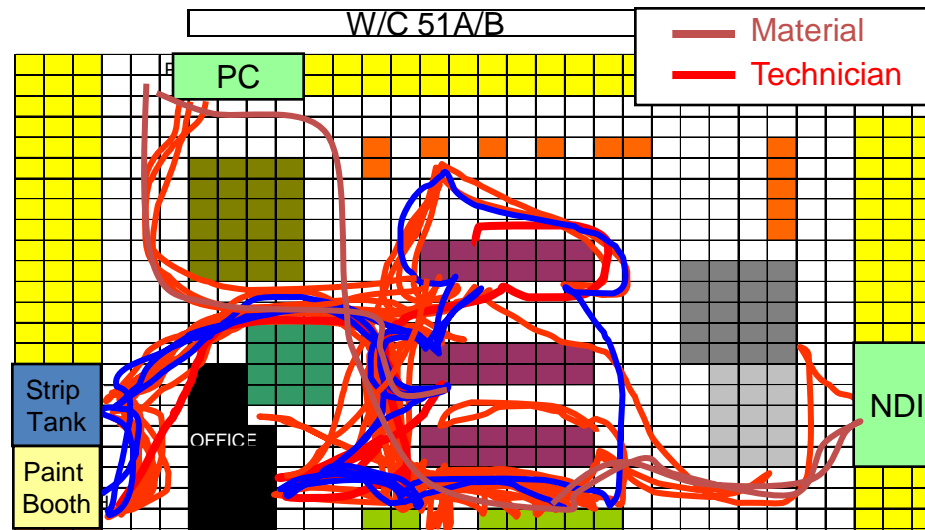


Spaghetti Diagrams

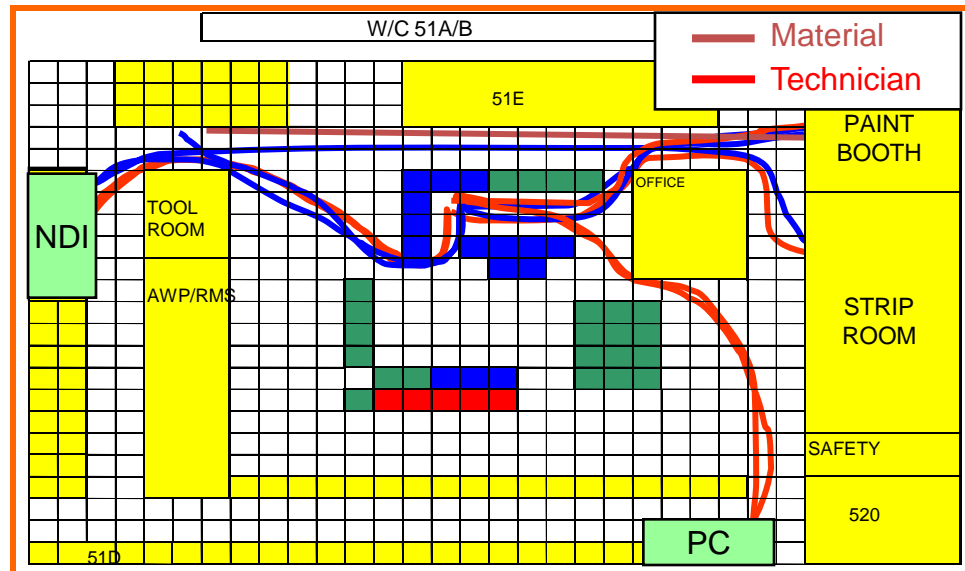
- Graphically describes the production layout, standard in-process inventory, and other factors in standard operations.
- Used to depict where there is wasted product, travel, people movement, queues, etc.
- Shows the physical area layout, flow of product through a series of process steps, or maps where a person walks to complete their process.

Before/After Spaghetti Diagram

BEFORE



AFTER



Objectives:

- Data Analysis
- Determine Root Cause

Activities:

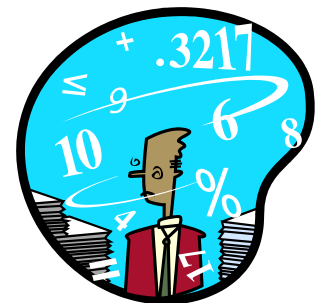
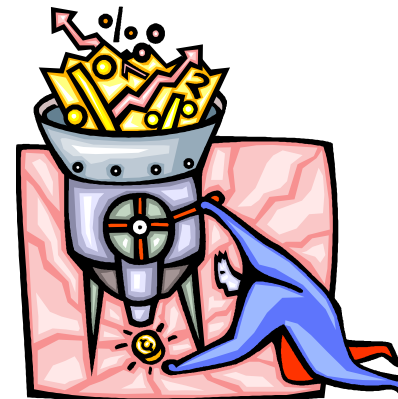
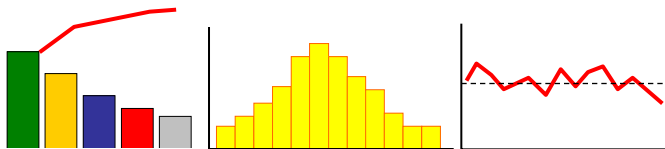
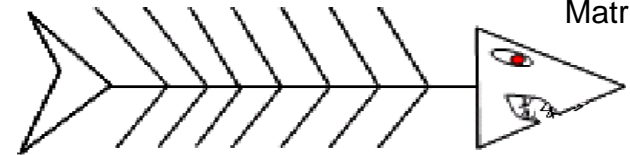
- Identify and validate Root Causes.
- Determine impact of root causes to process output.
- Prioritize root causes.
- Leadership approval (Review).

Analyze Phase Tools

- Tools

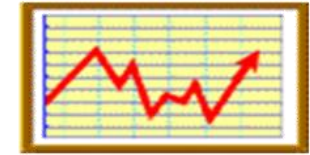
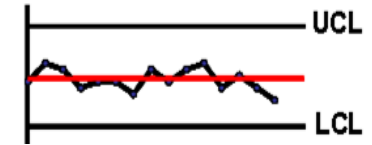
- Pareto Charts
- Cause and Effect Analysis
- FMEA (Failure Mode Effects Analysis)
- Statistics
- Process Capability

Cause &
Effect
Matrix

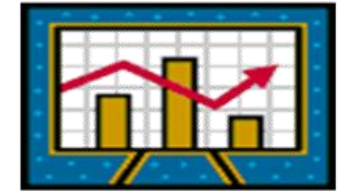


Example of Analysis Tools

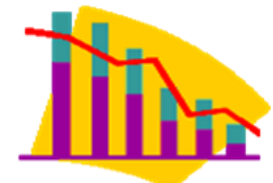
Control/Run/Trend Chart
Shows change over time.



Frequency Plot/Histogram
Shows distribution of variation and range.



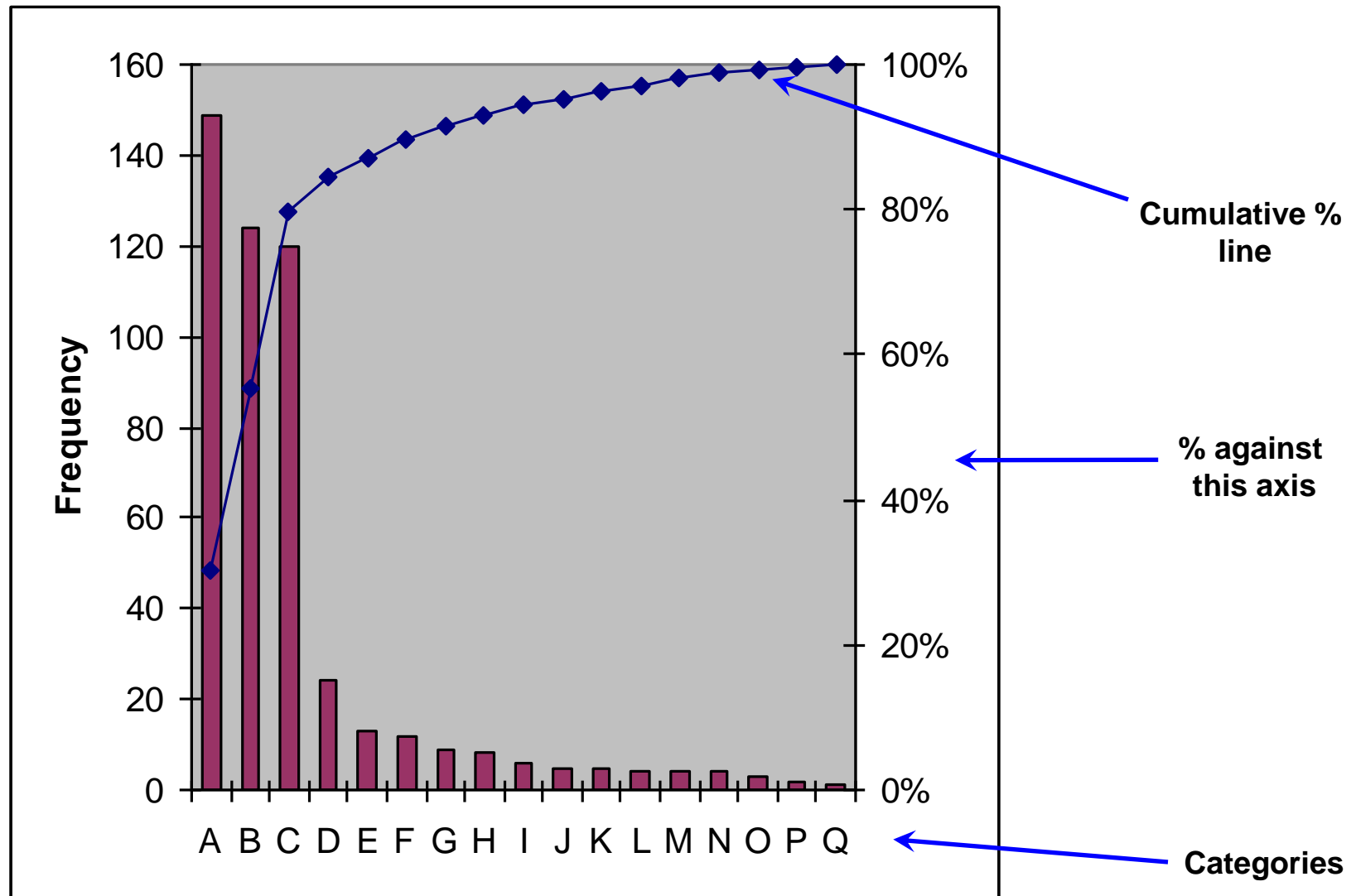
Pareto chart
Helps focus on key problems.



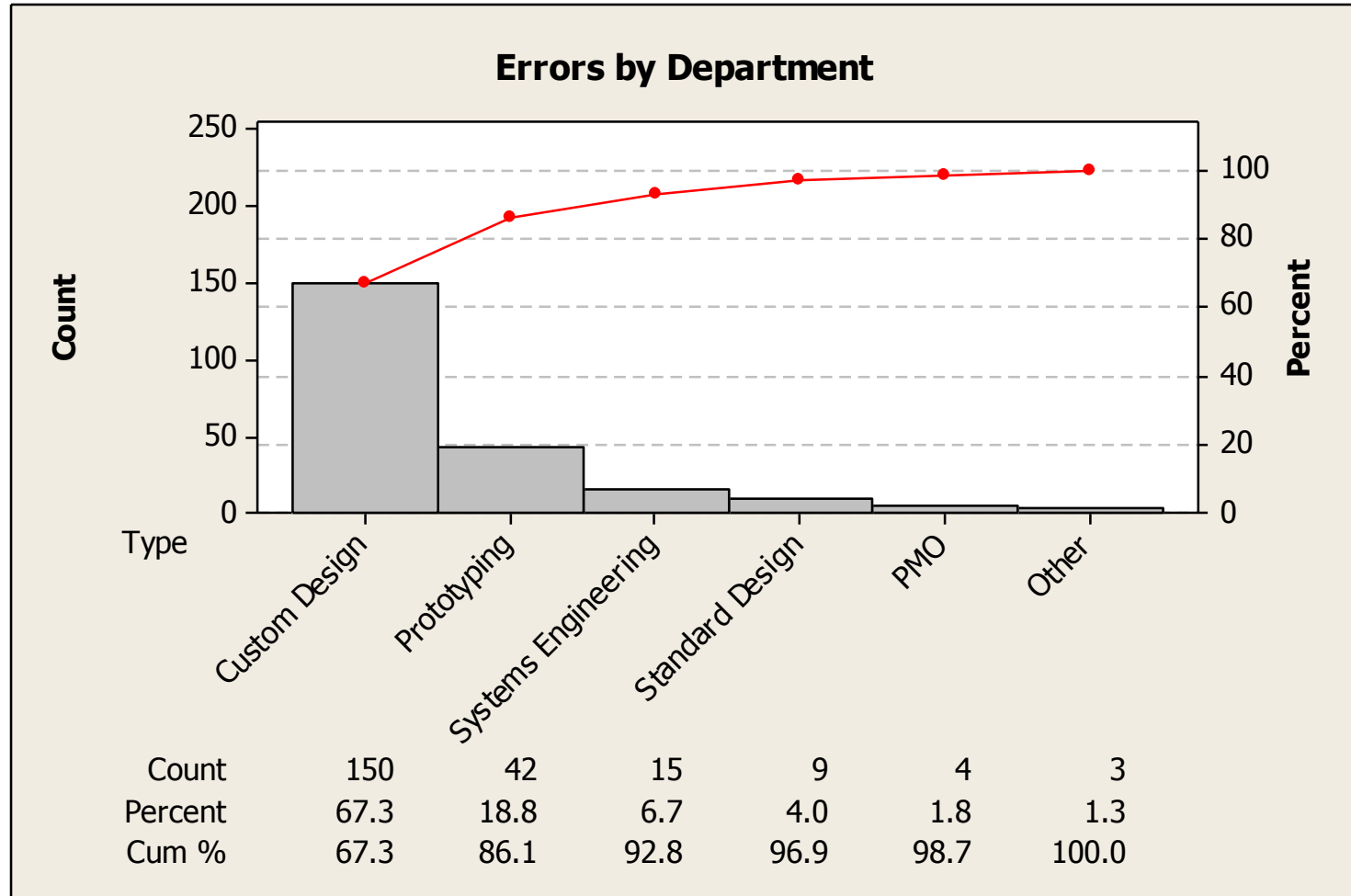
Pareto Charts

- Similar to histograms.
 - Aligns categories in descending order.
- The “80/20” Rule:
 - Pareto charts illustrate the concept that, for any given distribution of the results, the majority of the distribution (80%) is determined by a small part (20%) of the potential contributors or causes.

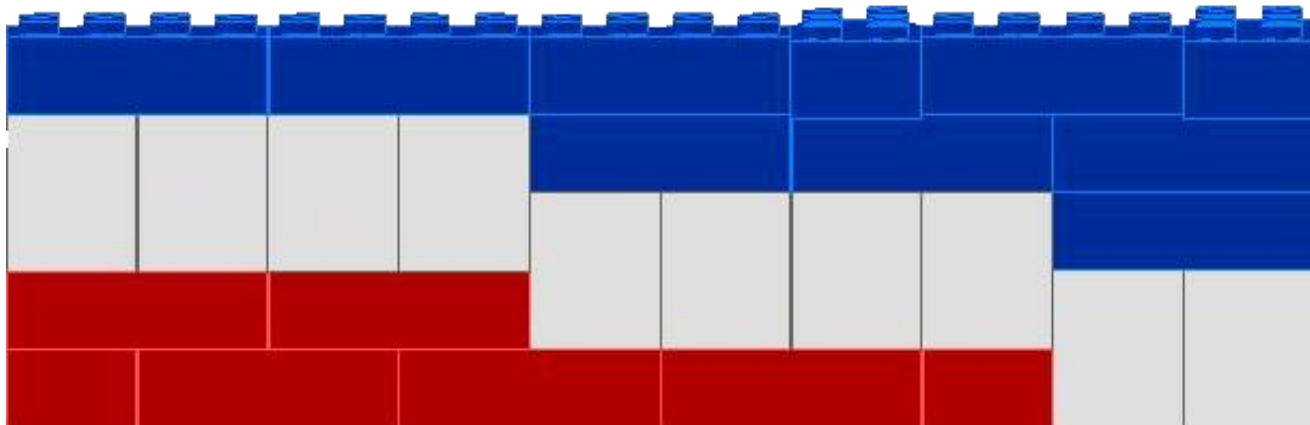
Draw the Pareto Chart



Pareto Charts - Example



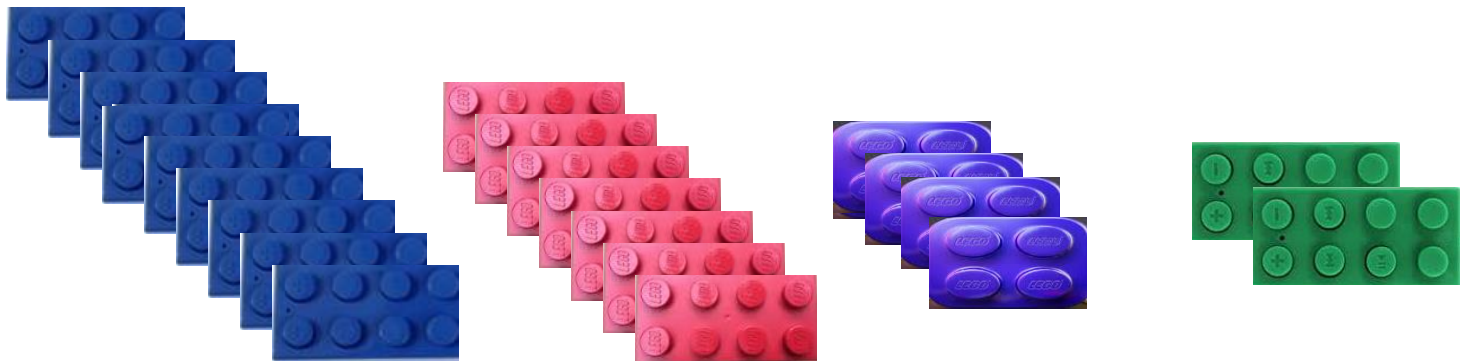
Yellow Belt



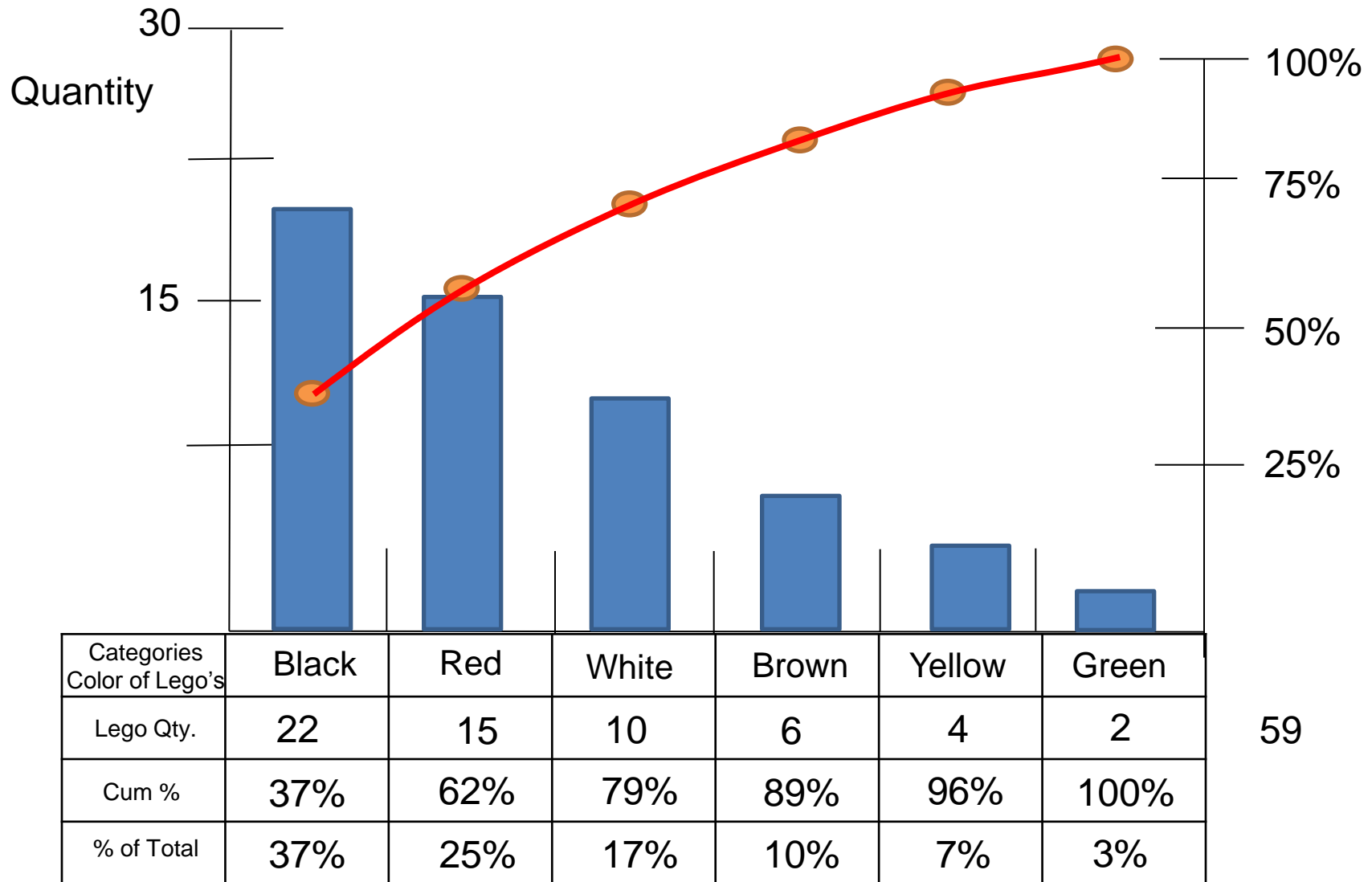
Pareto Chart Exercise

Pareto Chart Analysis Exercise

1. One Lego Bag per team.
2. Open Lego Bag.
3. Sort Lego's by color.
4. Highest number of Lego's on the Left.
5. Next Highest number of Lego's to the right.
6. Continue from highest to lowest until you reach the last color.
7. Plot the number of each color in descending order of magnitude.
8. Plot the number according to each color on the Occurrence Axis, from high to low.
9. Then plot the cumulative percent frequency showing the contributions from 0 to 100%.



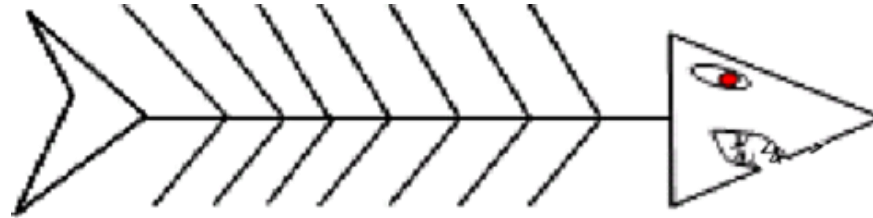
Pareto Chart Analysis Exercise



Exercise Review

- What does the chart tell you?
- Comparing your chart with the student next to you, is the chart the same?
- Which chart, you or your neighbor's accurately reflects the true population?

Root Cause Analysis



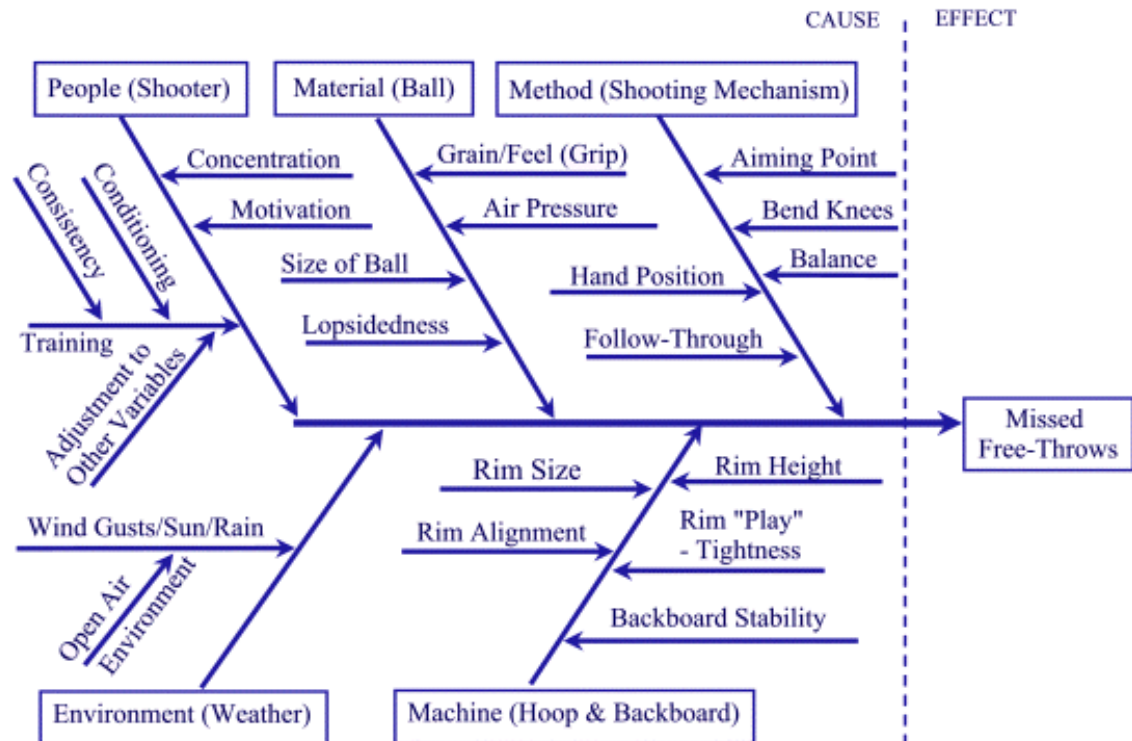
- Root cause analysis is where the *real* cause of the problem is uncovered.
- A root cause is one that, if corrected would prevent a recurrence of the problem.

Fishbone Diagram

- Breaks problems down into bite-sized pieces.
- Displays many possible causes in a graphic manner.
- Shows how causes interact.

Suggested Causes:

- Man
- Method
- Machine
- Material
- Measurement
- Mother Nature



Analysis – Determining Root Cause

Problem: Lincoln memorial deteriorating at a high rate.

1. Why: We wash this memorial more than the others.
2. Why: Bird droppings make it unsanitary for tourists.
3. Why: Birds eat the Spiders that gather in masse.
4. Why: Spiders gather to eat the flying midges that swarm.
5. Why: Midges swarm around the bright, warm lights that are turned on at dusk.

Answer: Delay turning on the lights for one hour.



Statistical Terminology

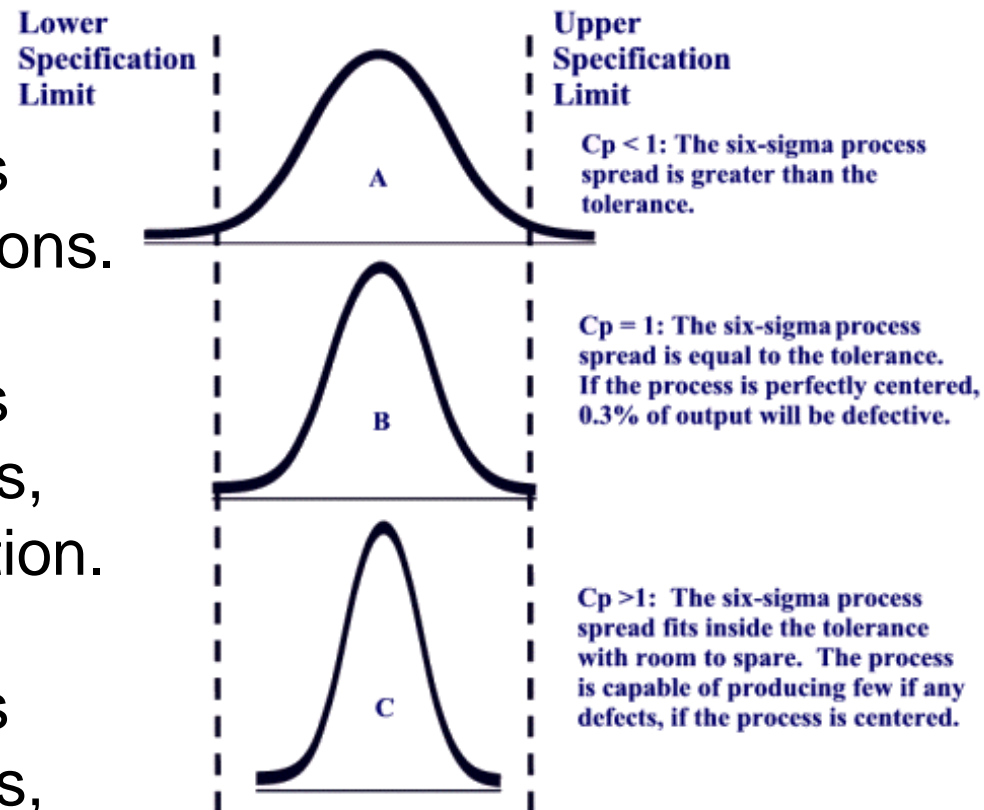
- **Population** - a complete set; all items of interest
 - The number of elements in a population is denoted by ***N***.
- **Sample** - a subset of elements from the population
 - The number of elements in the sample is denoted by ***n***.
- We can characterize a population or sample in 3 ways:
 - Measure of central tendency (location of center or middle).
 - Measure of variation (spread or width).
 - Measure of distribution (what does the set look like when viewed graphically (shape)).

Data Characteristics

- **Central Tendency (location)** – defines the location or center or middle of data.
 - Examples: Mean, Median and Mode
- **Variation** – defines the width of the data.
 - Examples: Range, Variance, Standard Deviation
- **Distribution** – defines the shape of the data, and a visual that can be more descriptive than just numbers.
 - Examples: Histogram, Stem & Leaf plots, Boxplots

Process Capability

- A measure of how close a process is running to its specification limits.
- Process Capability Values
 - Process Capability < 1 indicates a process that is unable to meet specifications.
 - Process Capability $= 1$ indicates a process that is able to meet specifications, but has no room for variation.
 - Process Capability > 1 indicates a process that is able to meet specifications, and can allow for additional variation.

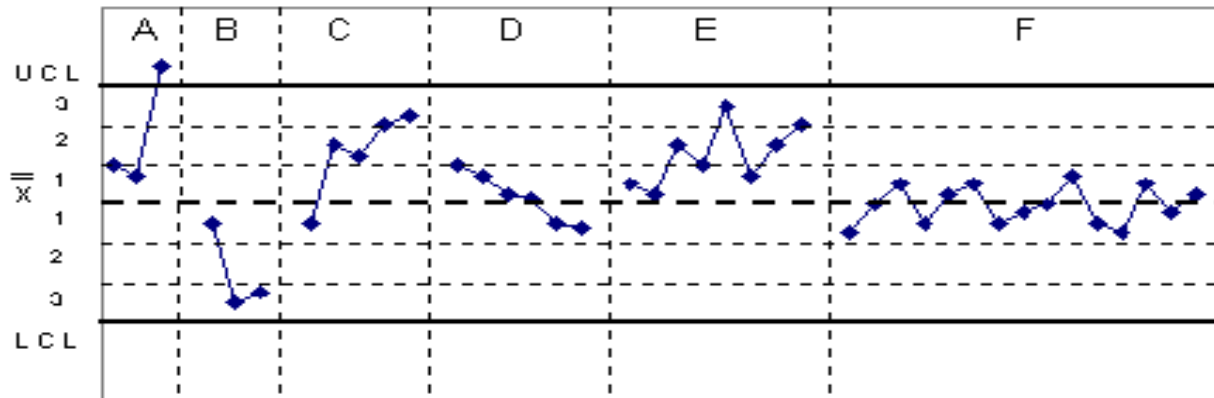


Control Charts

- Control charts are vary similar to Run Charts, but have additional information.
 - Centerline (mean)
 - Control Limits
- Used to analyze variation in a process.
 - Attribute (count) based.
 - Variable (measurement) based.
- Used to determine if variation is inherent to the system (common cause) or caused by an assignable event (special cause).

Control Charts

SPC CHART



1. If one or more points falls outside of the upper control limit (UCL), or lower control limit (LCL). The UCL and LCL are three standard deviations on either side of the mean. See A

2. If two out of three successive points fall in the area that is beyond two standard deviations from the mean, either above or below. See B

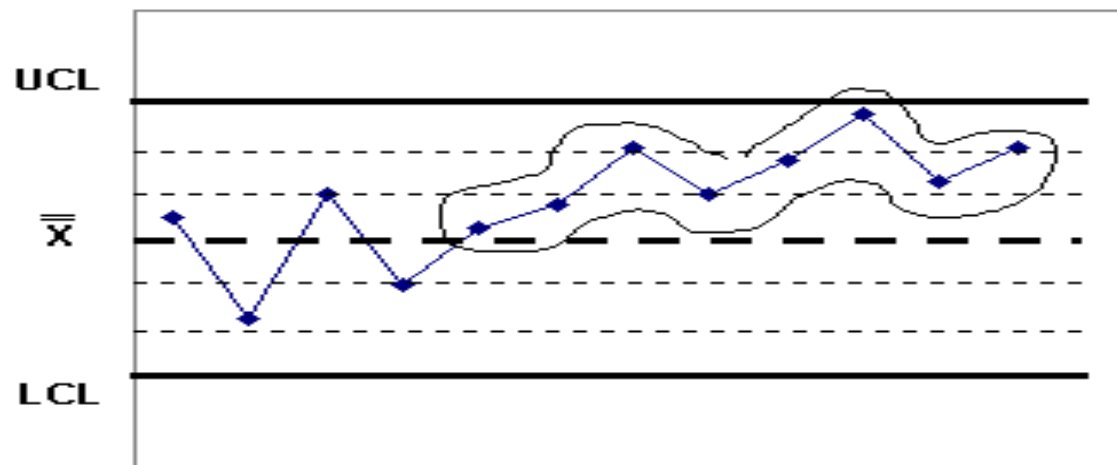
3. If four out of five successive points fall in the area that is beyond one standard deviation from the mean, either above or below. See C

4. If there is a run of six or more points that are all either successively higher or successively lower. See D

5. If eight or more points fall on either side of the mean (some organization use 7 points, some 9). See E

6. If 15 points in a row fall within the area on either side of the mean that is one standard deviation from the mean. See F

SPC Chart



Improve Phase

Objectives:

- Identify Potential solutions.
- Map out “TO BE” process.
- Develop an implementation Plan.
- Pilot solution.

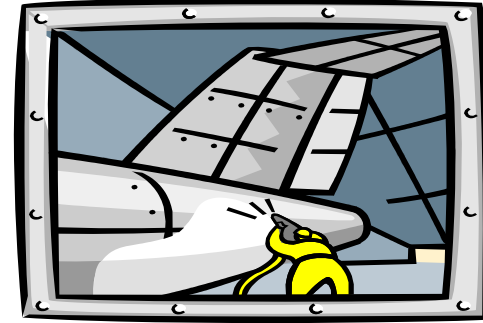


Activities:

- Brainstorm potential solutions.
- Evaluate and select best solution.
- Identify solution impacts.
- Produce “to be” process maps and present implementation plan.
- Communicate solutions to all stakeholders.
- Leadership approval (Review).

Improve Phase Tools

- Tools
 - Lean
 - 5S
 - Waste elimination (TIMWOOD & U)
 - Improve workplace layout
 - Standardized Work practices
 - Remove non-value added work
 - Reduce Variation (Mistake Proofing)



What is meant by “Standard Work”?

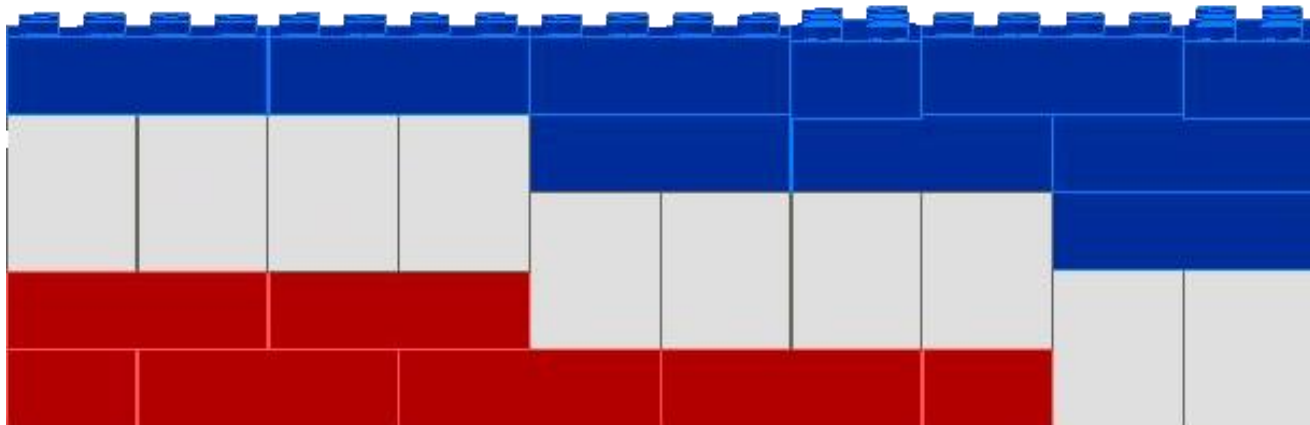
The principles, tools, and techniques used to ensure process standardization in a JIT environment.

- Developed by the people who do the work.
- Focused on efficient use of resources through waste elimination.
- Establishes the foundation for CPI.

**“Where there is no Standard, there can be no Kaizen.”
- Taiichi Ohno**

Exercise

Yellow Belt



Standard Pig

Pilot

- Piloting helps us understand the impacts of changes to the process.
 - Select your improvements and prioritize them.
 - If jobs are re-assigned make sure everyone understands their new role.
 - Use the pilot to ensure you have identified the root cause of the problem(s).

Control Phase

Objectives:

- Establish control plan.
- Verify improvements.
- Transition project to process owner.



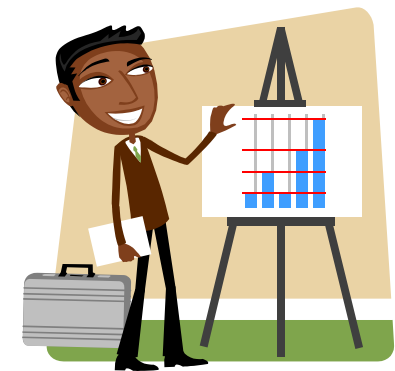
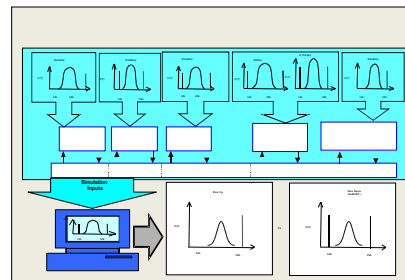
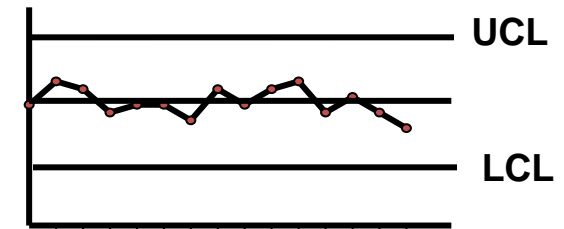
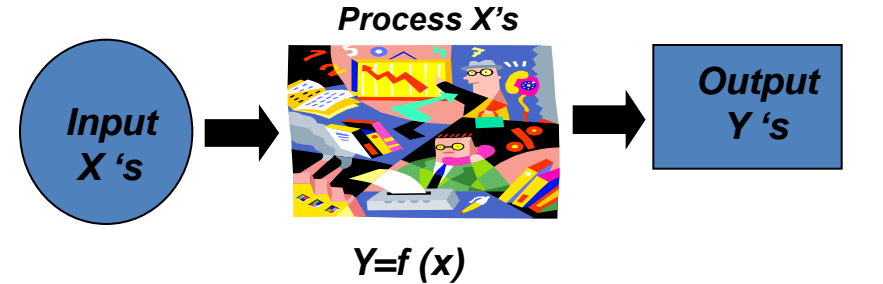
Activities:

- Identify replication opportunities.
- Update Standard Work Instructions.
- Integrate lessons learned.
- Integrate and Manage solutions in daily work processes.
- Prepare a project transition plan and management review.
- Celebrate your success.



Control Phase Tools

- Tools
 - Control Charts
 - Standard work instructions
 - Control Plan
 - Project Turnover Plan
 - Lessons Learned



Control Plan & Turnover Plan

- Control Plan
 - Provides a method for documentation and communication of control methods.
 - Control Plans are living documents.
- Project Turnover Plan
 - This where you develop and document the turnover of the project.
 - The Project will be turned over to the Process Owner.

Feedback Session

- Provides team with opportunity to reflect on the success of the project/event.
 - What Worked?
 - What Didn't Work?
 - What can be Capitalized?

CONTROL TOLLGATE



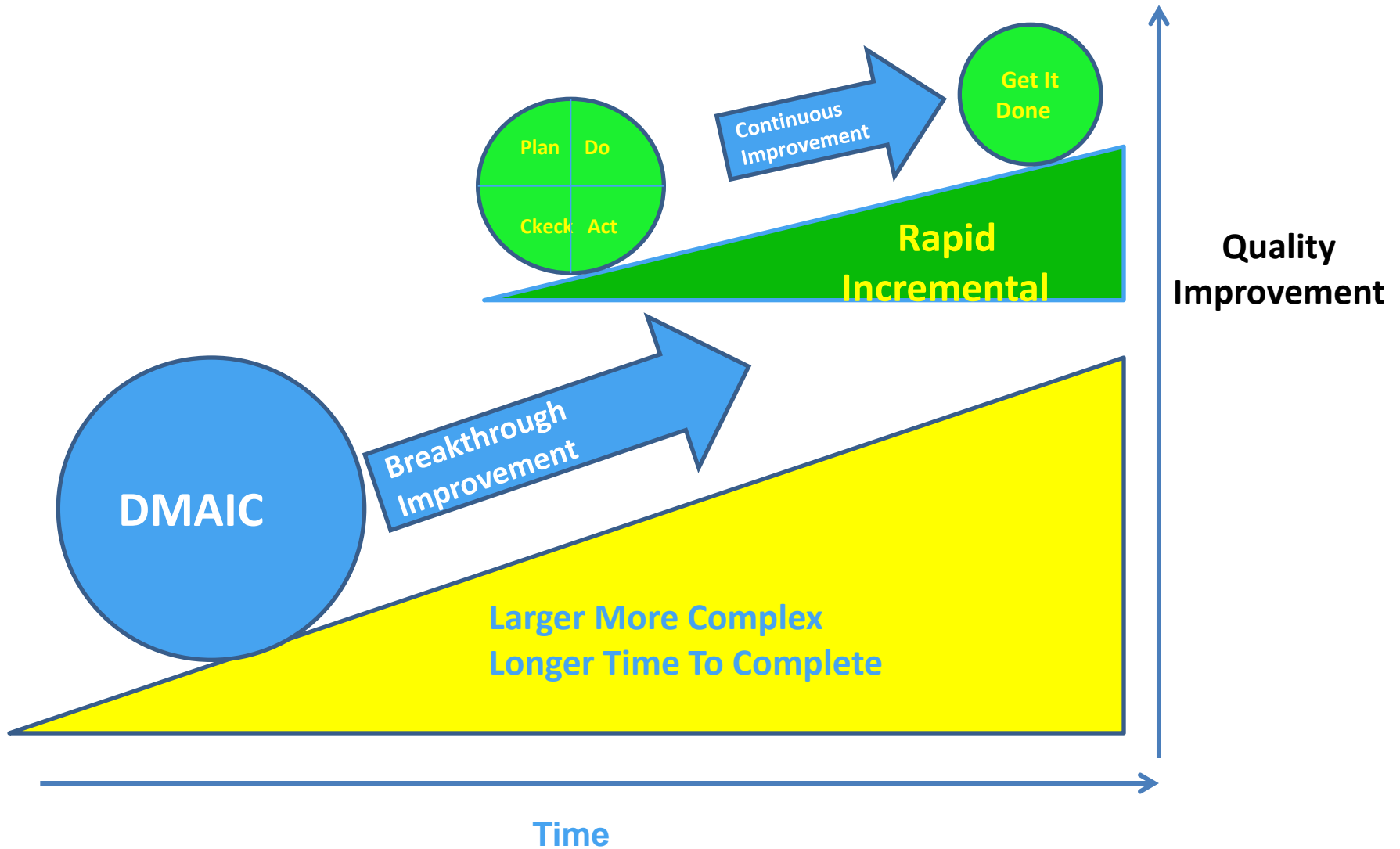
Complete Report Out

- Complete a Project Financial Metrics Worksheet
 - Project / Event Savings
 - Labor Saved / Avoided (in \$).
 - Material Saved / Avoided (in \$).
 - Space Saved (in Sq. Ft.).
 - Etc.
 - Project / Event Costs and Benefits
 - Cost of Manpower for Project / Event (in \$).
 - Return on Investment (ROI).

Types of Improvement Opportunities

Name	Duration	Scope of Change	Size of Team	Time to Implement
Just Do It	1-2 Days	Solution Ready to Implement – Problem Well Defined	Project Sponsor	Immediate
Kaizen/Rapid Improvement Event (RIE)	3-5 Days	Short Term, High Intensity Effort to Address a Specific Problem	2-8 (Full-Time During Event)	Immediate to Short Term
Project	3-6 Months	Complex Problem, No Apparent Root Cause	3-15 (Part-Time)	Mid to Long Term

Project vs. Event



How to Determine Project or RIE

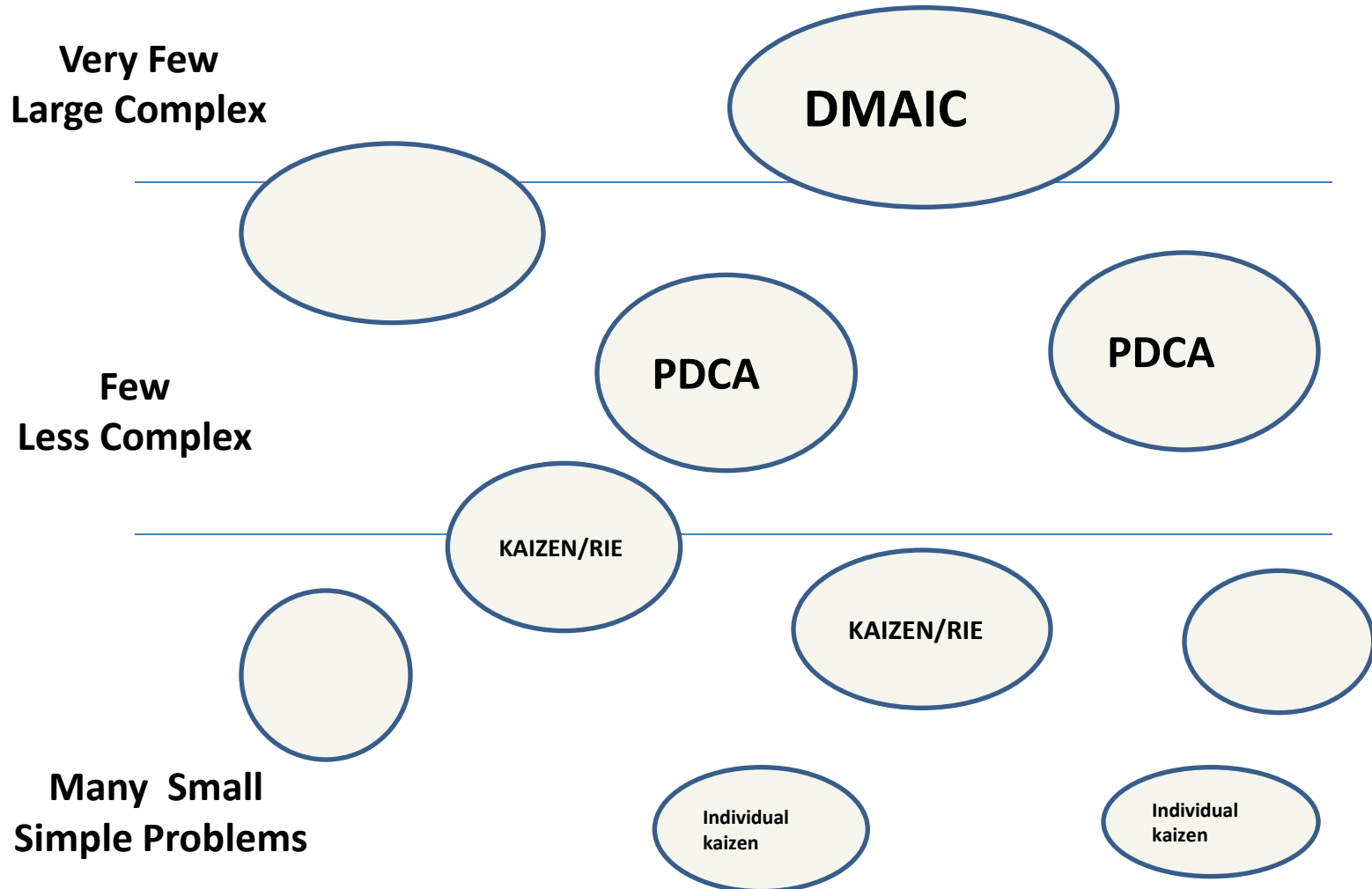
- A project is conducted when one or more of the following conditions exist:
 - There is significant or unexplained variation in the process.
 - The root cause of the problem is not readily apparent.
 - The problem is complex.
 - There is a significant quality problem.
 - There are test failures without obvious cause.
 - Significant data analysis is required to understand the problem.

Types of Kaizen / RIE

- Kaizen - Individual Continuous Process Improvement Event.
 - Smaller time frame than a project.
 - Limited in focus.
- Kaizen Blitz - Rapid Improvement Events (also known a 1-3 day workshops).
- RIEs can go longer (weeks / mos), but they are more for lightning fast improvements.

Problem Solving Alignment

DMAIC / Plan Do Check Act / Kaizen



RIE Using PDCA Methodology

Plan

1. Gather your team from division and customers. Describe the problem & the opportunity.
2. Describe the current process (current state map).
3. Identify the root cause.
4. Develop the solution and action plan.

Do

5. Implement team solution.

Check

6. Review and evaluate the results.

Act

7. Use what you have learned (replication).

RIE Using DMAIC Methodology

Define

- *Charter

Voice of the Customer

Measure

- *SIPOC

- *Process Flow Chart as-is

Analyze

- *Root Cause Analysis

- *Process Flow to-be

Improve

Brainstorming

5S

Control

- *Control Plan

Validate

- *ROI/ROE

LSS Improvement Opportunity Right Sizing

Which size project do you think will apply to your CPI efforts? (For an Individual & Organization)

Large Complex Mid Sized Individual

What type of problem solving method do you think will better work for you?

Can you think of a project that might be valuable at your organization and for other organizations?

Summary

- DMAIC / PDCA
- Variation Types
- Root Cause Analysis
- Types of Improvement Opportunities

Yellow Belt

Wrap Up

Learning Objectives

At the end of this lesson you will be able to:

- Understand the Vision, Keys to Success, and Takeaways of CPI.

- Vision
- Keys to Success
- Takeaways

Vision

- Use CPI tools to:
 - Achieve Cost Wise Readiness.
 - Ensure that products are “Ready For Tasking”.
 - Improve Quality of your product.
 - Improve your work environment and increase moral.
 - Increase customer satisfaction.
 - Work Smarter, not Harder!

Keys to Success

- Employee Involvement
- Clearly defined Command goals
- Stable deployment Teams
 - Teams have been proven to be most effective in the deployment and sustainment of gains in CPI projects.
- Identify & Empower Champions
 - Use and reward motivated people, then follow through.
- Visual tools
 - Strive to have visual tools that make it easy to see and understand the process, what the current status is, and any abnormalities.
- Atmosphere of Experimentation
 - Tolerate mistakes, demonstrate patience, etc.



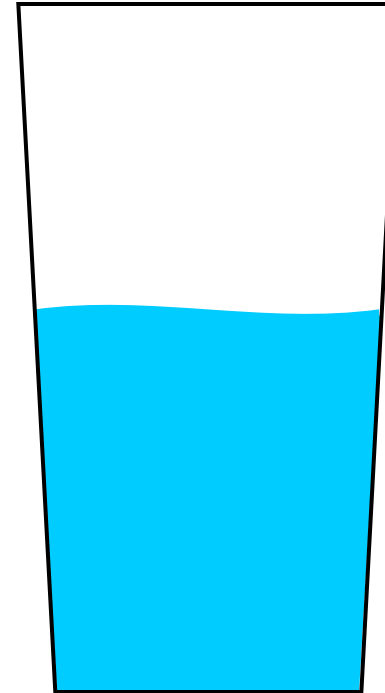
Take Aways

- CPI is all about reducing our cost of doing business by increasing Productivity and Quality.
- CPI concepts are well-proven, fully demonstrated and exemplify “**World Class**” business concepts.

“YOU Can Make a Difference !!!!!”

THINK CPI

- Optimist says:
 - The glass is half full
- Pessimist says:
 - The glass is half empty



*Standard
glass of water*

***CPI THINKER says:
The glass is the WRONG size***

Critiques





Everyone Doing Their Part



Sigma Quality Conversion Table

Yield	DPMO	Sigma	Yield	DPMO	Sigma	Yield	DPMO	Sigma
6.6%	934,000	0	69.2%	308,000	2	99.4%	6,210	4
8.0%	920,000	0.1	72.6%	274,000	2.1	99.5%	4,660	4.1
10.0%	900,000	0.2	75.8%	242,000	2.2	99.7%	3,460	4.2
12.0%	880,000	0.3	78.8%	212,000	2.3	99.75%	2,550	4.3
14.0%	860,000	0.4	81.6%	184,000	2.4	99.81%	1,860	4.4
16.0%	840,000	0.5	84.2%	158,000	2.5	99.87%	1,350	4.5
19.0%	810,000	0.6	86.5%	135,000	2.6	99.90%	960	4.6
22.0%	780,000	0.7	88.5%	115,000	2.7	99.93%	680	4.7
25.0%	750,000	0.8	90.3%	96,800	2.8	99.95%	480	4.8
28.0%	720,000	0.9	91.9%	80,800	2.9	99.97%	330	4.9
31.0%	690,000	1	93.3%	66,800	3	99.977%	230	5
35.0%	650,000	1.1	94.5%	54,800	3.1	99.985%	150	5.1
39.0%	610,000	1.2	95.5%	44,600	3.2	99.990%	100	5.2
43.0%	570,000	1.3	96.4%	35,900	3.3	99.993%	70	5.3
46.0%	540,000	1.4	97.1%	28,700	3.4	99.996%	40	5.4
50.0%	500,000	1.5	97.7%	22,700	3.5	99.997%	30	5.5
54.0%	460,000	1.6	98.2%	17,800	3.6	99.9980%	20	5.6
58.0%	420,000	1.7	98.6%	13,900	3.7	99.9990%	10	5.7
61.8%	382,000	1.8	98.9%	10,700	3.8	99.9992%	8	5.8
65.6%	344,000	1.9	99.2%	8,190	3.9	99.9995%	5	5.9

Goal: Quality Level \geq Six Sigma or as directed by your Command

99.99966% 3.4 6

